EUROPEAN MILITARY MEDICAL SERVICES

2021

Interview with Brigadier General Zoltan Bubenik, Czech Surgeon General

On track towards FOC

Covid-19 and the Navies: an Unexpected Passenger

BETA VERLAG & MARKETINGGESELLSCHAFT MBH

EMV+ | SAROS™ 4000

Revolutionizing Battlefield Oxygenation and Ventilation Therapy

Medical oxygen is essential for oxygenation and ventilation therapy, but its availability is limited, especially in remote combat areas.

Together with the ZOLL EMV+ portable ventilator, the CAIRE SAROS 4000 portable oxygen concentrator supports the clinical treatment of deployed military forces and helps to improve operational efficiency.[1,2]

The unique combination of these two field-proven devices can also help to solve related problems commonly found in combat environments:

- Depleting oxygen supplies during therapy
- Size and weight challenges of traditional oxygen tanks
- Logistical supply and resupply complications
- Bottle exchange and potential personal endangerment

In a comparative test with other leading portable ventilators, the combination of the EMV+ and the SAROS oxygen concentrator achieved the highest FiO_2 concentration among all tested devices.[3]

ZOLL®

Content

Words of Greeting 4

Interview with Brigadier General Zoltan Bubenik, Czech Surgeon General 5

On track towards FOC
S. Kowitz 8

Designed for extreme demands: MEDUVENT Standard 13

Resilient Response 2020
M. Kosak 16

M3-EPS: A Surge Capacity Concept for Pandemics and Crises
R. Maderthoner 20

Analysing Civil-Military Command and Control in the Response to the Covid-19 Pandemic
M. Bricknell 27

Covid-19 and the Navies: an Unexpected Passenger
B. Queyriaux 31

American–German partnership on a regimental level
M. Nolte 36

Overview of all members of the MMCC 43

Index of Advertising

Dräger Medical Deutschland GmbH 44

FUJIFILM SonoSite GmbH 11

General Dynamics European Land Systems Mowag GmbH 42

german ercelliance GmbH 24

Hamilton Medical AG 14

IVF HARTMANN AG 35

KARL STORZ SE & Co. KG 33

OFA Bamberg GmbH 19

Philip Morris Products S.A. 38

WEINMANN Emergency Medical Technology GmbH + Co. KG 13

Zoll Medical Deutschland GmbH 2

Additional highly infectious intensive care patients can be treated in module A under pandemic conditions.
© Bundeswehr/EKT

Dear Reader,

With this issue of EUROPEAN MILITARY MEDICAL SERVICES we focus on two things – on the one hand of course the Covid 19 pandemic and its various challenges and experiences so far, on the other hand we are pleased about the fundamental outlook of the Director of the MMCC, Brigadier General Dr Stefan Kowitz, on the future of the MMCC/EMC. He summarizes: "The MMCC/EMC strives to grow as a lighthouse project of EU/NATO cooperation and coordination in a functional domain, by combining the NATO FNC and the EU PESCO projects in one entity efficiently and successfully."

In addition, Brigadier General Zoltan Bubenik, Czech Surgeon General, reports on the focus of his activities in the Czech Military Medical Service.

For the future development of the magazine, we would very much appreciate, if you could tell us which topics are particularly interesting for you, what else would you like to know and what would you like to discuss with your European colleagues?

We hope you enjoy reading this issue and look forward to receiving your recommendations and ideas.

Heike Lange
Publisher

Imprint

Published by:
Beta Verlag und Marketing GmbH
Celsiusstraße 43
53125 Bonn, Germany

Tel.: +49 (228) 919 37-10
Fax: +49 (228) 919 37-23
E-mail: info@beta-publishing.com

www.beta-publishing.com
www.military-medicine.com

Managing Director:
Heike Lange

Portraits of the Medical Services:
Brigadier General MC (ret)
Dr med Lutz Bandekow

Advertising: Peter Geschwill
Layout: Carina Schmitt, DRILLING GmbH
Production/Coordination:
Thorsten Menzel/Karen Thelen

Klimaneutral Druckprodukt
ClimatePartner.com/12518-1907-1001

Dear readers,

In many countries of the European Union and in the Transatlantic Alliance, military medical services have supported the civilian health care system. It has been shown how important familiarity with difficult situations, good training, quickly available personnel, and central management of resources in short supply are. In this context, basic military skills like a quick estimate of the situation, development of alternative courses of action and concentration of effort, but also our medical expertise have helped to offset personnel and materiel shortages.

However, the core of our activities remains the provision of health care to our armed forces. As experts, we perform risk assessment regarding the health hazards for the service men and women entrusted to us and, thus, create security of action for military leaders. We assess infection protection of exercise units or during training and prevent that service members introduce infections into society. In this context, we pursue a Bundeswehr-wide and interministerial approach.

The pandemic reminds us every day how complex and diverse the challenges are that we must face. Therefore, solutions must also be sought in internationality. Despite all difficulties, an enormous strength lies particularly in the cooperation of the nations in organisations like the EU and NATO. The cooperation between our medical services is not only an expression of the lived solidarity and the cohesion of our Alliances. From the health situation to stability operations, humanitarian assistance through to collective defence: already with a view to our image of humanity, medical support is a responsibility neither political nor military leaders can escape. In this context, the concentration of expertise has proved successful in recent years. Centralisation, however, is not only an approach to the management of scarce resources in view of persistent operational stress, budgetary pressure and the lack of skilled labour. Rather, we respond to the wide range of scenarios, for which we can offer solutions in medical contexts that are modular and scalable and of constantly high quality. The employment of special capabilities in this context is efficiently organised and lies in the responsibility of the experts.

Germany is committed to multinational cooperation and makes a visible contribution to this cooperation in the field of the Medical Services with the Multinational Medical Coordination Centre/ European Medical Command (MMCC/EMC). This is confirmed by the high number of meanwhile 18 participating nations. In close cooperation with NATO and EU, MMCC/EMC has completed a successful year 2020, and 2021, too, will be full of challenges. Among other things, completion of the setup phase of MMCC/EMC is coming up. In November, we will train MMCC/EMC's role of multinational coordination in crises with a medical background together with our partner nations, civilian and military actors from the health systems and the relevant NATO and EU elements. Prospective issues like digitisation, military medical research, and up-to-date procurement procedures are indispensable in this context. Multilateralism is our common basis.

The tasks of the future confront us all. Therefore, a common approach to their solution is the right response. This common approach will not only show the reliability of the Alliances, but also prove the professional strength of the military medical services of our nations.

Dr. Ulrich Baumgärtner
Lieutenant General (MC) and Surgeon General of the Bundeswehr

Cooperation and coordination are key to success – the multifocal role of the Czech Armed Forces Military Medical Service

Interview with Brigadier General Zoltan Bubenik, Czech Surgeon General

Could you please be so kind as to describe the main structures of the Military Medical Services in your country? Are there any specific characteristics?

The last year was extremely turbulent, on the one hand, the COVID 19 outbreak and the first year of the big reconstruction of the Czech Armed Forces Medical Service on the other. After almost 20 years of the strong connection and subordination within logistic structures, again independence, and standalone pure Military Medical Structure. But still in three pillars, which are connected both inside a civilian and military structure. Under the responsibility of my Surgeon General Office – Military Medical Division, we have all the deployable structures and units (field hospitals, CSU, MEDEVAC/STRATEVAC), Primary Healthcare Units, Institute of the Hygiene and Epidemiology, Institute of the Veterinary Services, and many others. These units are integrated into the Military Medical Agency, where I had an opportunity to be a director since 2015 till the end of the year 2019. Military Hospitals and Faculty of Military Health Sciences, University of Defence, remain under the responsibility of the civilian divisions of the MoD, nevertheless cooperation is still my ultimate responsibility.

Field COVID hospital before opening October 2020 (source: AVIS)

What role does the Medical Service play in your country's armed forces?

As I mentioned above, the key coordination, conceptual, and standardization work and of course, key advisory role, is the responsibility of the Military Medical Division and is lying in the Surgeon General's hands. Especially to be an advisor to the CHOD and the Minister of Defence. Because legislation covering the delivery of the medical, hygiene and veterinarian care is the same as for the civilian counterpart, we are running a daily business at the same level as the civilian service, but predominantly to the military personnel.

So, this is a description of the "peacetime" situation. Moreover, the responsibility the support the deployable forces or, if you want, the responsibility for the crisis and "wartime" is a key task for the Military Medical Agency.

Could you please describe your cooperation with other military medical forces?

Due to the long-term existence of Czechoslovakia is of course still the tightest connection with our Slovak colleagues. The same level of education - for example after a split of former Czechoslovakia to the Czech and Slovak Republic - we again three years ago reincarnated education for our Slovak medical cadets in cooperation with the Faculty of Military Health Sciences. Another level of closer cooperation is with Poland, Hungary, and again Slovakia on the Visegrad Four Platform. However, the cooperation with other Military Medical Forces is mainly on an expert level – education and training courses, COMEDS working groups and panels, and many more. What I would like to stress is a cooperation on the institutional level, especially MilMED CoE in Budapest and Multinational Medical Coordination Centre/European Medical Command in Koblenz. These institutions play for us a key role in a multinational support.

How did the role change during the Corona pandemic situation – referring to the Czech Republic – which work did you do, how was the CMC?

We started to play a key advisory role, not only as a healthcare provider. There is close cooperation with the Ministry of Health, the Ministry of Interior, and many other institutions. This is highlighting the overall importance of strong military medical service. And finally, civil-military cooperation due to the crisis became true.

Are you involved in the nationwide vaccinations? What is the role of the military medical services in questions of vaccination logistics and when do you hope that a large part of the population can be vaccinated?

Vaccination in the Czech Republic is slower in comparison with other countries; however, the speed is going up within the last few weeks. I see the main reasons for the delay of the vaccine distribution from producers to the target countries, and of course, in the national line of distribution. However, we are improving. Military Medical Service is strongly participating mainly with an organizational issue, as coordination on the national level, establishing procedures and statistics. But – till this time (end of March) approx. 15 percent of the whole population is vaccinated, so it means a delay regarding the plans 1-2 months ago. If everything is going on according to the plan, in the middle of this year we could have vaccinated around 40-50% of a target number, and if 60% is demanded, we´ll be close.

Could you describe the cooperation within the European Military Medical Services during the Corona pandemic situation?

The main coordination or if you want consultation has been running almost since the beginning of the outbreak. So many phone calls, e-mail discussions, video teleconferences started very early.

First brief for a MC in NATO (source: NATO)

We discussed a different topic concerning a personal protective measure, technical equipment lacks (oxygenators, ventilators, etc.). Later we discussed possibilities of the therapy, progress on the vaccination development. But in my opinion, the key factor was a regular information exchange which showed the ability to help each other – with advice, lessons learned, deployment of the experts to other countries and last but not least – donation of the missing equipment.

General fitness is an important topic within the armies worldwide. Do you have launched any special fitness programs?
I must say that due to the national level of regulations the overall fitness of the population and the military too, was jeopardized. So, support done by military trainers delivered by social media to the target audience was one of the options, how to remain a military troop in an adequate condition. But we cannot see only a physical aspect of fitness as an important issue. A very effective nationwide psychological support was delivered again via social media, and there the military psychologists in cooperation with Faculty of Medicine launched a program to remain a population in good psychological status. For example, a direct effect is visible in a military environment, where the incidence of suicidal tendencies was almost zero last year.

How do you deal with legal drugs like tobacco and alcohol – is this an issue within the army?
Approximately ten years ago the Czech Republic and of course the military environment too started participation in a huge program named Reduction of the dependencies – mainly alcohol, drugs, tobacco, illegal drugs, and gambling. This is a nationwide program, where the military is playing a very important role. And why? Because in our environment healthy personnel – physically and mentally – is a key factor in success. Success in a fight, deterrence, and sustainability of the forces. Regular checks for alcohol and illegal drug detection, very strict rules on alcohol-consuming during deployment led to visible success. Therefore, a continuous activity regarding to prevention plays a very important role.

What developments has your Medical Service seen in the last 5 years and where do you see the specialist medical priorities in the future?
First of all, an increasing number of military medical cadets. We can see approximately a 50% increase compared to the last years. So, there I see a key factor for possible future success. Second development is seen in a structural change mentioned above, leading to an independent medical commanding body with a direct approach to CHOD. And third is a continuous activity regarding technical improvements as new equipment for field hospitals or if you want – overall support for deployability of the medical forces. The medical specialist priorities I see in fact in two main areas – and no matter if doctor or nursing staff. First, is an area of general practitioners and an adequate nursing staff. Why? Because these positions are covering a maximum of the peacetime activities as daily medical business for forces in their peacetime installations, support for a training activities both forces and our own field training. And a combination of the GP skills "updated" on a level of the basic urgent medicine skills is ideal for deployment regardless of peacekeeping or wartime operations. The second important group is an "invasive medical specialist" – all kinds of surgery and urgent medicine. This is a very hard task for a Military Medical Service because all these specialists are very attractive for a civilian environment and sometimes, we as the military are not so successful in their retention. So, these two categories are a basis for future sustainability.

Many Military Medical Services suffer from a lack of personnel. What is your situation – are you able to fill all the positions and if not, where is there a specific shortfall?
Of course, I cannot say I am fully satisfied. As you know recruitment and retention of the medical personnel is a never-ending story with a period of loss and success. But at least partial independence in the civilian sector due to still functional Faculty of Medical Health Sciences as a primary source of the medical specialist is very important. In the countries where Military Medical Services are dependent on the competition with the civilian sector, the problem is a deeper one. And for the category of nursing staff, we have still enough volunteers from a civilian environment willing to join the Armed Forces. This is important especially to the category of fully educated and skilled nurses and medics because for us this personnel is almost immediately ready to deploy after a short 2-3 months-long period of basic military training. So, this is an advantage. The specific shortfall I see in a category of the Role 1 staff, because these specific positions are not so attractive for a young graduated doctor. But everything is under development and I am persuaded to reach a satisfactory number for these positions within the next 5 years.

COMEDS Plenary 2019 NATO HQ Brussels (source: NATO)

How is the quality of your technical equipment?
Regarding to deployable medical treatment facilities (MTF´s) we can be satisfied. The renovation of the hospital corridor, specialized containers, bedside equipment, and let say overall status for a deployment is quite good. In the concept of the Armed Forces development and the consequent development of the Military Medical Services till the years 2025-2030, we have allocated a

satisfactory amount of the military budget, so perspective for a running process of the technical renovation is again good. We will focus on some key programs as the New Role 1 concept, FSE/SOST (Forward Surgical Element and Special Operations Surgical Team) concept development, and let me say focus on "lightweight equipment and installation" are a basic principle on way ahead. Due to last year budgetary constraints, we are unfortunately behind on the innovation of the transport means, both "soft skin" and armoured. But I am not scared yet because it means practically only move in the timeframe, better said postpone to the years 2024-2027.

Presidential visit Military Medical Agency 2015 (source: AVIS)

Cooperation on a European level is being intensified; one visible indication of this is the Multinational Medical Coordination Centre, MMCC. The medical service sector within the joint European defence policy is to be consolidated here. How do you see Czech's role in this project?

The Czech Republic and our Armed Forces Military Medical Service was since the beginning of the process a strong supporter. I appreciated an area of the responsibility of the MMCC and willingness to fill up a gap in the NATO structure for the support dedicated on the strategic or operational level. Even if the MMCC/EMC is still not an integrated part of the NATO Command or Force structure, we can see an increasing activity in the different areas. First of all an advantage, I see in the unique combination of the activities toward the NATO and EU. And why is this possible? Because we are working mainly on the medical issues. And there we cannot simply distinguish between NATO and EU, between peacetime or wartime, even between eastern and western medicine. In the principles, we are unified. Integrated. Impartial. Working on the humanitarian principles and results from Hippocrates oath. So, these are our strengths and opportunities.

Our support for a MMCC/EMC is mutual. We are (as the Czech Republic) working in the Steering group, joining the training and exercise activities, and of course planning future direct support with a possible deployment of the national military medical experts, like other NATO and EU members do. Now it is a question of a possible quote for a position dedicated to medical experts abroad. I as the Czech Armed Forces Surgeon General have an opportunity to stay with them since the first steps and both commanders – previous, BG Most and current, BG Kowitz - have my strong support. And within the last two years not only as a national delegate but additionally mainly as a COMEDS Chairman. Because we together have to bring visibility not only on a medical level – this is obvious - but also for a mutual success trying to bring this institution to the official position according to NATO and EU structures.

What are your expectations in this regard?

As I mentioned, the assessment of the military medical activities, especially in the last two years, reached an undisputable level. Training and exercise activities, coordinated advisory role with close cooperation with MilMED CoE in Budapest, and finally, one of the key advisory roles connected with the last year COVID 19 situation were appreciated not only with COMEDS Medical Services, but from the NATO HQ Military Committee, too. It means they are on the right way. But to be recognized as an official NATO/EU supportive Military Medical Institution requests a very long way. Honestly, this is an official status. The COMEDS community without any doubt is regularly assessing their activity with a regular COMEDS Plenary briefing, joining their activities offered to reach an adequate level of interoperability, and what is very important, we see this institution as complementary, not competitive. If I compare the areas of responsibility with the MilMED CoE, we can see some similarities, but more differences and specific interests. And I see especially an opportunity connected with a future organization of the medical training, regarding interoperability of the Medical Forces, what is the main idea of the VIGOROUS WARRIOR exercise series. This is still a key responsibility of the MilMED CoE, but I see the opportunity for a MMCC/EMC in specific areas to support a key player.

You have been the COMEDS Chairman for some time now. What obligations does such an office entail – and what opportunities do you see?

When in 2015 during Dublin COMEDS Plenary I have got an opportunity to led one syndicate with a BEL SG MG Laire and later present the outcomes of this syndicate to the other Surgeon Generals, I never imagined that this was a small if you want preliminary testing to lead a bigger "squadron" as the COMEDS whole family. In the Czech Armed Forces, I was a brand-new Surgeon General, replacing my predecessor BG Jurenka, and of course, to sit on a COMEDS Plenary table in a first position, as a national representative, was a totally different situation compared to a backseater! Nevertheless, this offer made to me – please think about a takeover of the COMEDS Chairman position – was a big surprise. I never imagined both being a SG and of course the COMEDS Chairman. But after the official statement made during the COMEDS Plenary in the Czech Republic in 2018 and the result of the election, it happened. For me a big challenge – lead a Czech Medical Service, being COMEDS Chairmanship, and still, the necessity to sustain my personal medical skills are very difficult to combine. On the other hand, the chairmanship in the "corona time" is the best opportunity how to raise the importance of the Medical Services and finally confirm, that this period is the best from the perspective to show our interoperability, no matter if on the national or international level.

Are there any particular points you would like to make us aware of?

During the last years we as a medical community show the importance of our advice, direct help, and influence for the military but the civilian area, too. We confirmed our impartiality, ability to work together during exercises, deployments, and finally homeland crises. The Covid era will be I hope very soon history, and we have to look into the future. And this is bright not only due to my temperament as an optimist. Everything in this world has a beginning and an end. I am confident!

On track towards FOC

The Director of the Multinational Medical Coordination Center/ European Medical Command (MMCC/EMC), Brigadier General Dr. Stefan Kowitz, reflects upon a successful year of growth and the advancement of a multitude of projects undertaken by the organization located in Koblenz. For the next few months, its primary focus is the establishment of the situation centre, serving as a coordination centre and broker for medical information and expertise at the operational level.

BG Dr. Stefan Kowitz/© Bundeswehr/Laymann

Two roots and one entity

In 2014, during the Wales Summit, the Heads of States of the NATO member nations endorsed the "Framework Nations Concept" (FNC). As an achievement of the medical FNC activities, eight nations started an initiative called Multinational Medical Coordination Centre (MMCC) in May 2017 - under the framework of the Bundeswehr Medical Service. The development of the MMCC is in line with MC 326/4 - NATO PRINCIPLES AND POLICIES OF MEDICAL SUPPORT (Chapter 1, page 4), as "management of medical shortfalls requires sustainable effort and the continuous attention of NATO and national political and military decision makers. NATO however can only provide the framework for effective cooperation, while the primary role and responsibility for shortfall management rests with the Nations".
At the end of 2017, the Council of the European Union established the Permanent Structured Cooperation – (PESCO). The project called the 'European Medical Command' was one of the first PESCO projects agreed upon in 2018. The Bundeswehr Medical Service assume primary responsibility for the development of the project.
Both projects address long lasting critical shortfalls in the medical environment and fill the lack of a missing medical coordination and support element at operational level.

The goals are to increase:

- medical readiness and resilience,
- medical civil-military interaction, and
- medical cooperation between NATO and EU.

At the 49th Plenary of the Committee of Chiefs of Military Medical Services in NATO (COMEDS) in May 2018, the Chiefs of the Medical Services declared: "…to maximize coherence and economy of effort and to avoid duplication, both initiatives should merge into one entity…"
Born in NATO - our slogan is: "Two Roots - One Team - One Capability;" to combine and synchronize Medical Support efforts. While understood for quite some time, the CORONA pandemic further highlighted the strong interdependencies between the civilian and military medical stakeholders in all NATO and EU nations.

EU/NATO Joint Declaration and Participating Nations

The goals, tasks, and processes of both projects, the Framework Nation Concept (MMCC) and the Permanent Structured Cooperation (EMC) are highly similar and comparable, although both serve two different institutions. To conform with the 2016 NATO/EU Joint Declaration and the 2018 COMEDS statement, the MMCC/EMC was established as one entity supporting both NATO and EU matters.

MMCC/EMC support the following fields of work of the EU/NATO Joint Declaration:

- Medical Situational Awareness
- Medical Crisis Response
- Bolstering Medical Resilience
- Medical Cyber Security
- Support in Exercises.

Declared by the 14 participating nations to be at Initial Operational Capability (IOC) on 4th September 2019, the MMCC/EMC will be fully operational by the end of 2021. As a dynamic and innovative institution, 18 participating nations (BEL, CZE, DEU, EST, ESP, FRA, GBR, GRC, HUN, ITA, LUX, LTU, NLD, NOR, POL, ROU, SVK, SWE) contribute to the expertise of the MMCC/EMC. Based on the FNC and PESCO projects, additional nations are in an observing position (AUT, FIN, PRT). More than 80 percent of the participating nations are NATO and EU member states.

MMCC/EMC Koblenz, Germany: well-connected – short ways

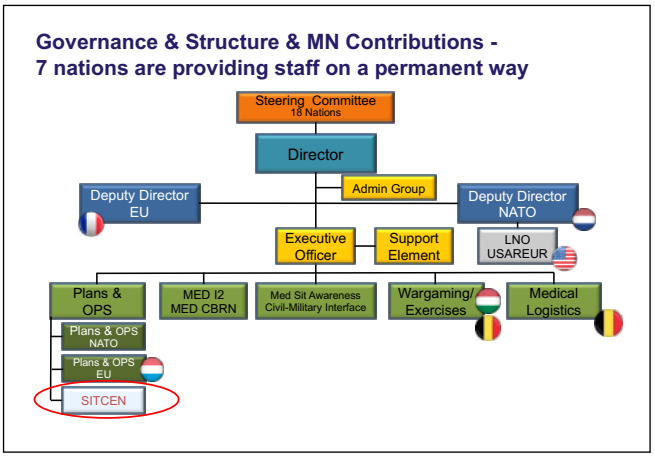
The MMCC/EMC is located in the western part of Middle Germany - in Koblenz, a Roman military post established by Drusus around 8 B.C. Its name originates from the Latin (ad) cōnfluentēs, meaning "at the confluence" of the river Mosel into the Rhine. The spot in which the two rivers come together symbolizes the unification of Germany and is known as the "German Corner" for that reason.
The MMCC/EMC is easily accessible and conveniently located. Only a two-hour car-ride from the NATO HQs at Brussels, Koblenz is also only 200 km northeast of Gadheim, the new geographical centre of the European Union. Additionally, U.S. forces headquarters and installations to include United States European Command (USEUCOM), United States Army in Europe and Africa (USAREUR-AF), Ramstein Airbase and Regional Health Command Europe (RHCE) are in close proximity.

Governance & Structure: Seven nations provide staff on a permanent way

During the last 18 months since IOC, we increased our personnel from seven to nearly 30. Key personnel include a Deputy Director for EU matters (provided by FRANCE) and a Deputy Director for NATO matters (provided by Netherlands) who assumed their duties and are now responsible for the respective EU or NATO-only projects.

Since March 2021, we established a liaison officer from US Army Europe and Africa Command (USAREUR-AF) who works the MMCC/EMC once a week for the next 12 months. In autumn, BEL and a HUN both will send a medical officer as well. So seven nations, including Germany, are providing personnel on a permanent basis.

Many thanks to the medical services of the armed forces of Belgium, France, Germany, Hungary, Luxembourg, the Netherlands and the USA, who all are providing staff members on a permanent basis for the MMCC/EMC. For further information, the structure of our entity is depicted on the following chart:



The MMCC/EMC Steering Committee provides the governance and tasking authority of the participating nations and in terms of NATO and EU regulations, and acts together with representatives of the participating nations in conjunction with the European Military Staff (EUMS) / NATO International Military Staff (IMS) / Supreme Headquarters Allied Powers Europe (SHAPE) / Allied Command Transition (ACT) Medical Advisors / COMEDS LNO as a permanent observer.

If tasks and the classification requirements allow, all branches of the MMCC/EMC work jointly. The deputy directors for NATO and EU matters are responsible for the governance of their respective projects and processes. NATO or EU-only tasks are processed by respective personal from NATO or EU nations. Although MMCC/EMC is one entity, the project management of NATO or EU-only related tasks comply with two distinct delineated processes and documentations.

Mission - Values

Our mission is supporting:

- EU and NATO Military Medical Services and HQs,
- coordination of medical tasks for rapid reinforcement for Europe including medical situational awareness,
- expansion of the civil-military medical interface,
- strategic patient flow management out of the JOA,
- coordinated procurement of medical material.

We facilitate the provision of military medical operational expertise for EU and NATO, and we support the harmonisation of civilian and military efforts to enhance the medical resilience.

As a benefit of this value, the MMCC/EMC is contributing with operational knowledge to increase interoperability and readiness in line with NATO and EU guidance in the following areas:

- Medical Resilience / Civil - Mil cooperation,
- Medical Wargaming / Medical Exercising at the operational level,
- Telehealth, Wearable Biosensors, Digital Competence,
- Medical CBRN Surveillance and Medical Intelligence related to CBRN,
- Joint Procurement and Stockpiling,
- Reach back for EU missions and operations, and
- Capability Monitoring and support for capability development

The MMCC/EMC supports the definition of operational capability requirements, user requirements and operational acceptance criteria for new capabilities and the validation of new capabilities in operational terms. The MMCC/EMC facilitates the implementation of the participating nations' capability development, based on existing Standardization Agreements, Capability Codes and Statements and Best Practices. MMCC/EMC is in the above fields of work a provider of expertise and subject matter experts with operational knowledge and experience,

The experiences over the past 12 months have shown, that a complex, volatile and uncertain setting requires a multidimensional, multi-stakeholder INTEGRATED and coordinated approach. There is a need for coordination of the nations with each other and EU and NATO stakeholders. After 12 months of growing our staff, we are establishing a Situation Centre (SITCEN) for the MMCC/EMC. This SITCEN will expand our current project-oriented support capability to include an operational coordinating capability.

By coordinating and synchronizing the expertise and capabilities of the various MMCC/EMC branches in the SITCEN, we are able to collaborate, coordinate and support:

- Medical Situational Awareness and Analysis based on a subject matter expert (SME) network,
- Development of multinational medical supply solutions for missions,
- Patient Flow Management with the focus on Strategic Medical Evacuation,
- Development of surge capabilities for crisis (examples include the reinforcement of a Medical Task Force (MTF) with additional intensive care unit (ICU) or laboratory capabilities or the provision of blood products),
- Multinational Medical Force-Building (setup of standardized MTFs/Medical Units/Medical Task Forces to facilitate the integration of multinational personnel and units)

Medical Situational Awareness

Situation assessment is stated to be the first phase of the military command process. It is a constantly running process of information acquisition, evaluation, linking, forwarding and storage. One of the core tasks of the MMCC/EMC is the development of a multinational medical picture, which will be named "Medical Situational Awareness (MedSA)". During the development of our concept and the fact sheets, we identified a standardization gap, as there

Soldiers from several nations stand around a table with a map of Europe on it.
© Bundeswehr/M. Dittrich

is no medical Standardization Agreements addressing medical situational awareness and reporting during peacetime, crisis and missions. The existing reporting systems for NATO and EU are mirroring the requirements of the operational commanders of the respective Joint Area of Operation. The current experiences from the COVID-19 pandemic have shown the necessity to have a comprehensive multinational health services situation picture with regard to various health services data and information.
Due to this fact the MMCC/EMC developed the first medical concept regarding Medical Situational Awareness (MedSA). This ambitious project requires an extensive data collection from the beginning and has already started to give an overview for example of burn units, hyperbaric chambers and fixed- wing medical evacuation (FW-MEDEVAC) capabilities in Europe. Still this work is in progress and not finalized. By developing this project, we are breaking new ground. The MMCC/EMC`s intent is to act as a broker of information or moreover to be seen as a broker of the required information, how to reach the right SME, who knows the required information.
This Medical Situational Awareness (MedSA) is also linked to the next wargaming of MMCC/EMC: Resilient Medical Interface Interface (REMI) 2021. We only can coordinate, if we have sufficient knowledge regarding the required medical information of our participating nations.

Formalized Cooperation

In the last year, we finalized our cooperative efforts through an Exchange of Letters (EOL) with the EUROPEAN EXTERNAL ACTION SERVICE - European Union Military Staff and HEADQUARTERS ALLIED POWERS EUROPE. Now it is our aim to fully energize this EOL via regular staff talks between SHAPE and EUMS Medical Advisor and projects.
Based on staff talks of NATO MILMED COE and MMCC/EMC, detailed working relationships and delineation of tasks of both organizations were developed and were finally signed by both directors on the 18th of March 2021. Both organizations, NATO Military Medical Centre of Excellence (MILMED COE) and MMCC/EMC, advise NATO Command Structure (NCS) in their area of expertise. The MMCC/EMC will focus on operational level functions in close connection with SHAPE and its subordinate commands. The NATO MILMED COE and the MMCC/EMC work in a complementary and coordinated manner to concentrate efforts and resources to the benefit of the medical support of our forces in the best and most efficient way. The Program of Work of both entities are coordinated and harmonized to complement each other's work.
During the last year, the director of the MMCC/EMC was invited to provide an update of the MMCC/EMC for the Military Committee of EUMS and NATO HQ and European Parliament's Subcommittee on Security and Defence (SEDE).

Response to COVID Pandemic

Throughout the pandemic, the MMCC/EMC focused on strengthening its coordination role and increasing the readiness and resilience critical for an effective pandemic response. We can only beat the virus and confine its consequences by cooperating across borders. It is obvious that multinational solutions are required to end this pandemic. The crisis has shown that our nations are resilient but will be even more resilient if working together.
The MMCC/EMC used its established network generating links between health services for questions about aeromedical evacuation and the provision of medical equipment for example. As the CORONA pandemic has proven once again, there are strong interdependencies between the civilian and military medical stakeholders in all NATO and EU nations.
In April 2020, NATO's Euro-Atlantic Disaster Response Coordination Centre (EADRCC) asked the MMCC/EMC to develop the NATO COVID Trust Fund medical stockpiling concept on short notice. The first donations toward the stockpile were distributed by NATO HQ to nations in need to lessen the effects of the pandemic. Based on these experiences, the MMCC/EMC have extended that medical stockpiling concept to the so called Military Modular Multipurpose Epidemic/Pandemic Stockpiling (M3-EPS) Concept, which is accessible to EU and NATO nations and medical stakeholders. As a surge capacity, rapidly deployable and modular standard packages of medical materiel have been identified and defined for stockpiling. The modular standard packages can be used to support both, military and civilian medical facilities. For example, the bilateral support that the Bundeswehr Medical Service provided to Portugal included the deployment of ICU capability utilizing the principles of the M3-EPS. In parallel, the MMCC/EMC has started to exchange information regarding stockpiling efforts with DG SANTE and DG ECHO (more details about this concept, page 20).
Another contribution in response to the COVID-19 Pandemic is the exercise RESILIENT RESPONSE 2020 (RERE 2020). This war game was organized by MMCC/EMC in close cooperation with the Hybrid Centre of Excellence (CoE) and the German Federal Office of Civil Protection and Disaster Assistance (BBK). The purpose of RERE 2020 was to provide an interdepartmental, cross-sector, multinational epidemic/pandemic war game, with the aim to train decision-making for a mainly strategic leadership. It simulated a crisis environment with a focus on European countries. (more details about this wargaming, page 16).
Both projects were achieved in close cooperation between NATO and the EU. As a young organization, the MMCC/EMC will contin-

ue to support the different efforts of NATO and the EU. MMCC/EMC has initiated projects, which are providing multinational solutions for outbreak response.

Medical Forces Building and SOP Library

The Very High Readiness Joint Task Force (VJTF) Land Brigade 2023 for the NATO Response Force (NRF) consists of troops from eight nations with Germany, the Netherlands, and Norway serving as the Lead Nation Group. In support of the Lead Nation Group, the MMCC/EMC was asked to serve as the lead of the Multinational Medical Working Group, the steering element responsible for coordinating multinational medical support for the VJTF brigade. This brigade constitutes the spearhead of the NRF. The initial focus of the MMCC/EMC was the development of the brigade's multinational medical task force and to resource the multinational Role 1 medical support. As a result, multinational medical contributions have been integrated and harmonized to a powerful medical task force consisting of units, subunits, or personnel from various nations. The success of the multinational medical task force is a direct result of those nations already contributing to the MMCC/EMC and reconfirming the requirement for a multinational approach to medical support.

Building upon the multinational medical task force, the MMCC/EMC developed the multinational medical concept that describes the medical procedures, responsibilities, and collaborative relationships in a multinational environment. It can be used as a blueprint for other nations and medical lead units in the future. MMCC/EMC's quick development of the concept is a benefit for not only the NRF but also the contributing nations of the MMCC/EMC.

An additional example of increasing interoperability and readiness is the creation of a SOP library as a mission memory. We do not want to reinvent the wheel. Moreover, it is our aim to collect generic SOPs, references and examples from recent and current missions, operations and exercises, to establish a basis for future deployments in a permanent platform to share data and information. The MMCC/EMC offers a coordinative support to the individual capabilities provided by the troop-contributing nations to establish a Multinational Medical Task Force in order to improve readiness and responsiveness. The MMCC/EMC will be able to build on these examples and experiences multinational medical units or taskforces as a basis for future deployments with shorter preparation time.

Biosensors supporting Healthcare in Missions

The COVID-19 Pandemic demonstrated the increasing relevance and demand for Tele-Health to meet critical health needs while reducing exposure. Additionally, the advantages of utilizing wearable biosensors to support healthcare in missions have become more apparent in recent years, leading the military medical services of several nations to implement various solutions in the near future.

Together with the NATO COMEDS Tele-Health Team (HIST WG), the MMCC/EMC is organizing and hosting a virtual workshop on

Sonosite began with a grant from the US Department of Defense. For over 20 years, Sonosite has been providing products to our military forces and to disaster areas to help physicians and medics quickly diagnose and begin life-saving treatment to trauma victims.

Sonosite's Edge II ultrasound system carries on the tradition of exceeding military specifications for ruggedness and reliability and is ready to scan within seconds of a cold start. Sonosite systems are field-tested and great tools for the pre-hospital environment.

For more information, please contact us at eraf-sales@fujifilm.com or by phone +44 1462 341151.

www.sonosite.com/uk

SONOSITE, the SONOSITE logo, EDGE II are trademarks and registered trademarks of FUJIFILM SonoSite, Inc. in various jurisdictions.
FUJIFILM is a trademark and registered trademark of FUJIFILM Corporation in various jurisdictions. All other trademarks are the property of their respective owners.
Copyright © 2021 FUJIFILM SonoSite, Inc. All rights reserved. Subject to changes.

3395 UK 04/21

Biosensors supporting Healthcare in Missions on May the 18th through May 20th 2021. The chairman of the NATO COMEDS Tele-Health Team (HIST WG), LTC Prof Scheid, is the scientific advisor for the workshop.
The three programme clusters take great care to present a well-balanced and informative agenda. The first cluster and day is about the implementation of Biosensors supporting Human Performance and Soldier / Warfighter Readiness. The second day focuses on the use of Biosensors in missions - Health and Medical Management Applications. There will be presentations about Biosensors in supporting triage situations and improving medical awareness during missions for example. On day 3, various considerations in wearable biosensors will be explored to include ethical, legal, and chemical-biological-radiological and nuclear (CBRN)-related concerns.
Conference participants include subject matter experts from national and international institutions to include the Johns-Hopkins-University, Fraunhofer Institute for Manufacturing Engineering and Automation, British JHUBMED, COMEDS, Swiss Center for Military Medical Ethics (University of Zurich), and the Netherlands Organisation of Applied Scientific Research (TNO).
The finalized programme includes 30 Speakers from 17 nations (AUT, BEL, CHE, CZE, DEU, ESP, EST, FIN, FRA, GBR, GEO, HUN, ITA, NLD, SVK, SWE, USA). Around 90 participants have signed in to join this event.
The objective of the MMCC/EMC is to bundle knowledge and consolidate the understanding of this important field. Our goal is the creation of a Community of Interest in Telehealth and especially in Wearable Technology. Depending on the future developments, the mid-term aim of the MMCC/EMC is to develop a Tele-Health-Hub together with COMEDS Tele-Health Team (HIST-WG)

Wargaming Resilient Medical Interface 2021

During the past few months, the MMCC/EMC developed and implemented a series of wargames which included extensive external participation. Filling an identified gap in multinational medical support, participating nations have asked that the MMCC/EMC continue the wargarming series. During 2021, the MMCC/EMC's warming efforts focus on the training and exercising of the MMCC/EMC´s Standing Operational Procedures and its capability as a multinational coordination element, including medical hybrid threats. The main aim of the exercise is to integrate the participating nations into the coordination process of the MMCC/EMC and using the SITCEN.
The scenario is a No armed conflict - a crisis on NATO's flanks combined with Hybrid threats. "Shocks" and crisis-like developments with medical focus request for civilian-military and supranational coordination.
We would like to advance the correlation between medical resilience and deterrence including a strong EU and NATO Medical Civ-Mil Interface. In this wargame, we will increase the attention of the MMCC/EMC to its coordinating function with military and additionally civilian health services and organizations. The new project is called Resilient Medical Interface (REMI) 2021. The key challenge will be, that the MMCC/EMC will the organizing and facilitating element for the wargaming on the one hand and in parallel play the role as the primary training audience. The wargame REMI21 will be an important part of our evaluation for the Full Operational Capability (FOC) of the MMCC/EMC and to fully implement the concepts and strategies the MMCC/EMC have been developing over the past months.

SUBSTANTIAL NATO-GEORGIA PACKAGE (SNGP)

"The Defence and Related Security Capacity Building (DCB) Initiative reinforces NATO's commitment to partners and helps project stability by providing support to nations requesting assistance from NATO. DCB helps partners improve their defence and related security capacities, as well as their resilience, and, therefore, contributes to the security of the Alliance. Five DCB packages have been launched thus far. The DCB package for Georgia was agreed in 2014 at the Wales Summit and intensified in 2016 at the Warsaw Summit. It is provided through the currently adapted Substantial NATO-Georgia Package (SNGP), which includes support in a wide range of areas" (https://www.nato.int/cps/en/natohq/), like for example medical capability, Special Operations Forces, military police, maritime security or air defence.
Based on a request of NATO and supported by the NATO Member Nations, the MMCC/EMC will have a leading role and provide its medical operational expertise and SMEs for to meet medical requirements of the SUBSTANTIAL NATO-GEORGIA PACKAGE (SNGP). The MMCC/EMC initiated the medical aspects of the project in February 2021 via initial communications with the NATO Core Team in Tbilisi, responsible for coordinating the implementation of the package. The MMCC/EMC is very careful to align the SNGP efforts with those of other nations within Georgia as to not duplicate efforts while enabling Georgia to achieve their stated goals.

Summary

The MMCC/EMC has delivered valuable support to EU and NATO initiatives over the past few months via the delivery of medical subject matter expertise, medical resilience and civil-military cooperation, medical wargaming, telehealth and wearable biosensor initiatives, and capability monitoring and development.
The MMCC/EMC is ready and able to support with mission and operational impact NATO and EU via its operational knowledge and capabilities to the benefit of the health of our soldiers by combining 'Efforts in Medical Support'
The MMCC/EMC will be busy over the next few months developing processes necessary to achieve FOC status for Medical Crisis Response. The final FOC criteria are in development together with the Steering Committee of the MMCC/EMC. In this process, the wargaming REMI 21 will be an important milestone.
The MMCC/EMC provides a bridging function between EU and NATO for military and civilian medical stakeholders. MMCC/EMC strives to grow as a lighthouse project of EU/NATO cooperation and coordination in a functional domain, by combining the NATO FNC and the EU PESCO projects in one entity efficiently and successfully.

Author:
Brigadier General Dr Stefan Kowitz, MD
Director MMCC/EMC
Andernacher Straße 100, 56070 Koblenz
E-Mail: mmccdir@bundeswehr.org

Designed for extreme demands: MEDUVENT Standard

The MEDUVENT Standard ventilator from WEINMANN Emergency has been on the market for more than a year and has since been used successfully by several military units and civil protection organizations worldwide. The Hamburg-based company has more than 45 years of expertise in the field of medical technology and has been working successfully with NATO for three decades. Many WEINMANN employees were or are active in pre-hospital emergency care, they know exactly under which conditions the products are used and what is important for the user. This is how the company's motto "We Simplify Saving Lives" is embraced every day. When developing the device, the focus is on the special requirements of out-of-hospital emergency medicine. In addition to easy operation, it goes without saying that the devices are suitable for outdoor use. Whether in the rain, cold or high heat, all devices have been designed for extreme demands. This is one of many reasons why MEDUVENT Standard is particularly suitable for the military medical corps.

When providing care in the field, it is particularly important that the patient is treated quickly, safely, and in accordance with guidelines. Each move must be spot on and ventilation should start without delay. MEDUVENT Standard impresses with its intuitive menu navigation, the different emergency modes and the introduction of body height. The ventilator is set up and ready for use in just a few simple steps.

But what makes the ventilator so unique is the flexible oxygen supply: Especially during long transport times, during non-predictable missions or in remote areas, sufficient oxygen is not always available. MEDUVENT Standard can provide patients with artificial ventilation using ambient air, even without an external gas supply. Of course, additional oxygen can be administered at any time via the globally compatible oxygen inlet hose. In addition to the classic oxygen cylinder including pressure reducer, a concentrator or another oxygen cell can also be connected. An inspiratory oxygen concentration of 21 to 100 percent can be achieved, all without the device consuming any itself.

With around 2 kilograms and a device volume of 3.5 liters, MEDUVENT Standard is one of the smallest and lightest emergency ventilation devices in its class.

All functions of MEDUVENT Standard were developed especially for the pre-hospital with the expertise of the armed forces and rescue services.

You can find more information on: weinmann-emergency.com

A strong NATO partner for more than 30 years

WEINMANN medical technology

Emergency ventilator

MEDUVENT Standard

- Flexible, oxygen-independent mobility due to turbine technology
- Optional oxygen supply without consumption for operation
- Diverse ventilation modes for invasive and non-invasive ventilation
- The hygiene filter protects patient, staff and ventilator from contamination
- Replaces BVM and triggers mechanical breaths quickly and safely via MEDUtrigger
- Built robustly as well as easy to operate

Medical technology for unconventional operations

We Simplify Saving Lives Follow us on: WEINMANN-Emergency.com

HAMILTON-T1 Military

The intelligent ventilation solution for pandemics and mass casualties

- ✓ Used by the US Army, Swiss Armed Forces, German Bundeswehr and many other armed forces during the coronavirus
- ✓ Accompanies your patients to any destination, either within or outside of the hospital, on the ground, at sea, and in the air
- ✓ Equipped with high-grade HEPA filters
- ✓ Optional NBC filter adapter for use with NBC filter canister
- ✓ All consumables are available as single-use items to minimize the risk of infection and cross-contamination
- ✓ NATO stock number NSN 6515-01-648-5814

www.hamilton-medical.com/HAMILTON-T1military

HAMILTON MEDICAL

Emergency preparedness ventilators must be versatile enough to meet the demands of a mass casualty and/or pandemic event. The **AARC** provides a list of requirements in **Guidelines for Acquisition of Ventilators to Meet Demands for Pandemic Flu and Mass Casualty Incidents[1],** all of which the HAMILTON-T1 either meets or exceeds.

Wide range of patient populations and ventilation therapy options

- ✓ Fully featured ICU ventilator
- ✓ State-of-the-art ventilation modes, including high flow oxygen therapy, noninvasive and invasive ventilation modes
- ✓ For all patient populations from a 200-gram neonate through to an adult

Independence from external power, compressed air and oxygen sources

- ✓ Battery operating time of up to 9 hours which can be extended with additional hot-swappable batteries
- ✓ Independent from compressed air sources due to an integrated high-performance turbine
- ✓ Peak flows of up to 260 l/min
- ✓ Able to ventilate with ambient air only (21% O2)

Ease of use

- ✓ Intuitive user interface
- ✓ Quick startup settings
- ✓ All-in-one, pre-assembled breathing circuit sets for increased efficiency and safety

Patient safety and lung protection

- ✓ In the intelligent ventilation mode ASV®, the ventilator continuously adjusts the respiratory rate, tidal volume, and inspiratory time depending on the patient's lung mechanics and effort
- ✓ ASV automatically employs lung-protective strategies and encourages the patient to breathe spontaneously
- ✓ With ASV, even staff with basic training can provide safe ventilation therapy

Mobility and versatility

- ✓ The lightweight, compact design of the HAMILTON-T1 makes handling of the ventilator much easier
- ✓ The water-resistant housing offers impact protection and a shock-resistant, anti-reflective display
- ✓ A robust and watertight transport case allows the HAMILTON-T1 to be palletized, charged in a protected environment, and easily deployed
- ✓ The case includes two breathing circuits, an operator's manual and a charging function

1 https://www.aarc.org/wp-content/uploads/2018/08/issue-paper-acquisition-of-ventilators-2008.pdf

Resilient Response 2020

A web-based wargame with a focus on pandemic response and hybrid threats

From the first idea to an online wargame

In cooperation with the German Federal Office of Civil Protection and Disaster Assistance MMCC/EMC hosted a Workshop (WS) in early March 2020, not long before the flaring Corona crisis. One day of the workshop focused exclusively on upcoming pandemic. The WS laid a foundation for efficient multinational civil-military cooperation for an even better preparedness and surge requirements for an outbreak scenario and major incidents within a MASCAL scenario. For the further work it was suggested to conduct a wargame with pandemic focus. This has been the starting point for the wargame Resilient Response 2020 (RERE20).

Not only many European nations, but also the EU and NATO took part in the wargame

In parallel the leadership of the European Centre of Excellence for Countering Hybrid Threats (Hybrid CoE) and the Multinational Medical Coordination Centre/European Medical Command (MMCC/EMC) started talks to conduct jointly a wargame whose scenario included both medical challenges and hybrid threats. Additionally first cooperation activities started under the lead of King's College London that organised a workshop captioning wargaming the Pandemic's Effects. As the project progressed, the German Federal Office of Civil Protection and Disaster Assistance (BBK) was brought on board as part of the Core Planning Team. RERE20 was part of the Program of Work (POW) of the MMCC/EMC and supported the efforts to increase European medical cooperation within the framework of the DEU EU-presidency in the second half of 2020.

King`s College London provided scientific support and together with the Hybrid CoE introduced the MMCC/EMC to the wargaming community. Wargaming has low set up costs, is flexible, transparent and with a high repeatability. It provides a unique decision making environment for the players. Wargaming is an excellent tool for military operation planning and conflict simulation for example in business environment.

During the first phase of preparation and design for the wargame in early 2020, the COVID-19 pandemic emerged in Europe. The management of a pandemic in the face of hybrid threats - including disinformation campaigns regarding COVID-19 - became a dominant issue. Therefore, the focus of the wargame has been specified quickly: the pandemic as the central topic including the influence of hybrid threats.

The game design and the gameplay derived from this should give the participants the opportunity to get to know the challenges of this scenario in four turns and to develop appropriate strategies to cope with them. Gameplay was repeatedly aggravated by the team around Ms. Shiho Rybski from the Hybrid CoE through misinformation campaigns, cyber- and other hybrid attacks. The combination of military, hybrid and civil protection expertise in the core planning team has been a benefit for developing and conducting of the wargame.

Civilian and military participants discuss different approaches

The wargame took place from 23 to 27 November 2020 focusing on providing an interdepartmental (cross-sector) multinational epidemic/pandemic wargame. In the first turn 117 participants from 12 nations and five multinational organisations could still largely draw on the real world experience gained from the first COVID-19 wave in their "Initial Response to the pandemic". The second turn – "Managing the Pandemic" - already had to be mastered with significantly less experience. However, at the latest with the third round - Second Waves' Phenomena - the wargame, which took place at the end of November 2020, had arrived at the current events and challenges and with turn four – "Overcoming the Pandemic" - confronting the players with future dilemmas.

More than 117 experts from health, civil protection and security sectors plus 12 national teams participated in RERE20 as the training audience. Nations participating were: Croatia, France, Germany, Great Britain, Hungary, Latvia, Luxembourg, Netherlands, Portugal, Romania and Spain and Sweden. Six of the national teams were mixed (civilian/military), three of the teams civilian only and three more teams military only. From the 117 participants, 73 were male and 44 female. The average age of the team members was 43 years. The White Cell consisted of attendees from the

North Atlantic Treaty Organization (NATO), the European Union (EU) and the United States of America (USA). NATO Headquarters (HQ) was represented by International Staff Ops Division and the Euro-Atlantic Disaster Response Coordination Centre (EADRCC). The EU was represented by Directorate-General European Civil Protection and Aid Operations (ECHO), Directorate-General for Health and Food Safety (SANTE) and the EU Military Staff (EUMS). With the United States European Command (USEUCOM), the USA Medical Service was also involved in the wargame as a Response and Support Cell. The observers were from – among others – King's College London, Supreme Headquarters Allied Powers Europe (SHAPE), Joint Support and Enabling Command (JSEC), the European defence Agency (EDA) and the Centre of Excellence for Military Medicine (MILMED COE). Apart from hosting the event, the MMCC/EMC also integrated as a facilitator for nations, civilian and military stakeholders of EU and NATO.

The Deputy Surgeon General of the Bundeswehr gets a first-hand impression of the work in the simulation cell

A special feature and a great challenge of this wargame was that it was run web-based and so took place completely online, via video conferencing, chat and telephone.
The main objectives of the wargame were:

1. To train the whole of government response to a crisis situation (epidemic/pandemic) influenced by hybrid threats on the base of existing emergency-concepts, best practices and lessons identified / learned during the COVID-19 pandemic.
2. To increase the awareness of decision makers on the complexity of decision-making.
3. To train cross governmental coordination and cooperation within an epidemic / pandemic hybrid crisis scenario.

Evaluation

The evaluation concept takes into account the special environment and the web-based nature of the wargame. The participants are all in their respective nations, therefore the evaluation of decision-making and responses given needed to be done via several methods.

1. Observations made by the Lead Evaluator and his team on the exercise information flow between participants and Exercise Control (EXCON) as seen from the EXCON perspective;
2. Questionnaires provided to the teams' Trusted Agents at the end of each turn;
3. Short virtual backbrief / discussion with Trusted Agents at the end of each turn;
4. After-Action Review at the end of each day;
5. First Impression Reports at the end of the exercise written by each team including EXCON

Designing a pandemic wargame

The game's basic design has derived from a wargame developed by a US Naval War College senior wargaming expert. During seven months of intense preparation, the MMCC/EMC developed the wargame's architecture, scenario, simulation, rules and force generation. The wargame scenario covered several months of an emerging pandemic, in which crisis response decisions had to be taken at national and on international level in order to minimise the negative impact of the crisis. It simulated a crisis environment with a focus on European countries and organisations and was divided into the four turns already mentioned: Turn 1 "Initial Response to the Pandemic", Turn 2: "Managing the Pandemic", Turn 3: "Second Waves' Phenomena", Turn 4: "Overcoming the Pandemic". The aim of the three-day wargame was to train decision-making and provide medical advice for a mainly strategic leadership to minimise the negative impact of the crisis.
Three simulation-models have been adapted for the wargame: a virus model, an economic model and the so called sentiment model. The models have been adapted to generate a scenario which helps the players to understand fundamental properties of the different systems during a pandemic with hybrid influence. They should be a reduced representation of reality with few parameters. The parameters must be accurate and able to separate the important from the unimportant and recognize the complex interrelationships.
Players could influence these models with pre-defined decision options based on up to date scientific data. The option of using so called Wildcards, a possibility for the national teams to develop their own creative solutions, was chosen 54 times during the game, 16 of those where so "out of the box" that they needed evaluation by the adjudication team. This team, which consisted of three experts, civilian and military, assessed the free decisions regarding their influence on the pandemic, the economy and the sentiment. The simulation cell was responsible for transferring the decisions into the individual computational Simulation-Models and reporting the results back to the participants in the form of a changing situation. While EXCON had information about the exact influences of a decision on the game, this information was not available to the players. Therefore, the participants had to either draw on their experience or discuss the expected influences. Additionally the decisions had to be coordinated with other nations or organizations.
So called breakout sessions after each turn of the game were used to discuss particular issues and to provide better insight and knowledge of different stakeholders and institutions. During the first breakout session, the Hybrid CoE had the opportunity to raise awareness of hybrid threats and their diversity. The second Breakout Session was held by the European Union, which explained the instruments of EU Civil protection pool and rescEU capacities. During the third breakout session the MMCC/EMC was presented and last but not least NATO gave an overview about crisis response mechanisms during the fourth breakout session. The wargame has been introduced by the keynote speech of Lieutenant General Martin Bricknell, who served as Surgeon General of the British Armed Forces from 2018 to 2019. Based on his appointment as a Professor of Conflict, Health and Military Medi-

cine at King's College London and advisor to their Centre for Military Ethics, he provided an overview of the involvement and the supporting role of the medical services of NATO Armed Forces during the first wave of COVID-19.

Key findings of a success story

The three-day exercise was valuable to all participating nations and allowed a fail-safe practice and enhancement of planning, communications and decision making. It was embedded in a credible scenario with other states and organisations - not available elsewhere.

The wargame was a success and the feedback of the participants was consistently positive. Some of the key findings of the evaluation are briefly presented here:

- The wargame objectives have, in overall, been achieved. Although during the preparation phase there was still the hope to conduct the wargame as a face-to-face event or at least in a hybrid approach (partly face-to-face, partly online), the organizing team had to face the challenge to conduct the wargame completely web-based. With this format in this order of magnitude, new ground was broken. All the greater is the success that the objectives of the exercise could be achieved.
- The combination of military, hybrid and civil expertise in the core planning team has been a benefit for planning and the execution of the wargame. Countries managed to support solidarity measures. On the other way the cooperation between member states and EU/NATO institutions in the wargame was more quickly than in the real world. The wargame enabled the comparison of the national crisis management strategies and enhanced the exchange of experiences and strategies to deal with the current COVID-19 pandemic.
- The capacities and the procedures for EU and NATO cooperation mechanisms are now better known, this will increase preparedness and makes quicker response possible. The combination of information about the individual mechanisms during the breakout sessions and the opportunity to make use of these mechanisms during the exercise proved to be a successful concept.
- Overall the more diverse teams (background, experience, gender) created better / more creative solutions. Not surprisingly, teams that have a particularly diverse membership also make the decisions that take the most aspects into account.
- The players' strategy changed throughout the game from "dealing with the current problem and neglecting future effects" to towards a more forward looking strategy developing solutions for the future. Although the players were familiar with the content of the first round from their own experiences, it was probably due to the fact that the participants first had to settle into the game that there was initially only reaction. Later, more anticipatory play and also proactive decisions were made.
- The capacity to rapidly set up a multi-agency task force, a "Whole of Government Approach" in response of a complex emergency including the high importance of Strategic Communications is paramount. A traditional, stovepipe-like approach is not appropriate to manage a complex crisis. After we have all experienced the current pandemic, this point certainly needs no further explanation.

Assessment and the way ahead

The wargame highlighted a range of further coordination which was required at the national, EU and international levels to ensure interoperability between the public health and civil protection/ security sectors.

One of the recommendations most heard from participants was that regular training and wargaming should be held with Member States and EU level in order to improve inter-sectoral crisis management and raise awareness of the range of mechanisms in place across the different sectors to deal with threats including hybrid. Such training and wargaming would raise awareness of hybrid threats and promote an understanding of how they differ from other threats.

It was suggested best practice in preparedness and response from the different sectors could be shared at these events. A complex, volatile and uncertain setting requires a multidimensional, multi-stakeholder INTEGRATED and coordinated approach.

RESILIENT RESPONSE 2020 provided an opportunity for the participants from across the public health, the civil protection and security sectors to come together and engage in a pandemic scenario additionally being challenged by hybrid threats. Whilst the wargame demonstrated that, in general, there is a good understanding of the roles and responsibilities during such an incident and a given level of awareness of systems and mechanisms, which are available, the wargame also highlighted that further coordinative and cooperative work is required at Member States and EU levels to ensure interoperability between the various sectors. The wargame contributed to improve the civil military interface and medical resilience in order to develop a required synchronized approach to tackle a pandemic crisis.

As stated in some of the comments/requests of the nations the MMCC/EMC is considering to organise an "RESILIENT RESPONSE" exercise with a relevant contemporary topic in cooperation with other stakeholders in Europe on a regular basis.

14 months after declaring IOC, the MMCC/EMC demonstrated its high standards of coordination and collaboration for the development of wargaming with strong external participation. Education and awareness of what constitutes a hybrid threat will be essential in future wargaming events.

MMCC/EMC would like to build up correlation between medical resilience and medical deterrence including a strong EU/NATO Medical Civ-Mil Interface. In our next wargame, called RESILIENT MEDICAL INTERFACE 2021 (REMI 21) we will increase the focus of the MMCC/EMC in its coordinating function with military and civilian health services & organisations.

Author:
LTC Dr. Maren Kosak
Bundeswehrzentralkrankenhaus
Abteilung X
Rübenacher Straße 170
56072 Koblenz

Optimal Support and maximum freedom

The Push knee braces

Knee injuries are a common problem among military personnel, both in training and in service.[1] The majority of these injuries can be attributed to either overuse or acute trauma resulting, for example, in torn ligaments.[2] Activities typical for military duty such as marching, squatting or bearing heavy weights put a lot of stress on the knee joint and contribute to the development of knee injuries.

Anterior knee pain especially is exacerbated by this kind of activities resulting in pathologies like patellofemoral pain or patella instability. These can limit the ability to perform essential tasks which in turn can lead as far as a medical discharge.[3] Braces such as the Push care Knee Brace can help to prevent it from getting to that point. The Push care Knee Brace stabilizes the joint through its compressive effect and supports the patella. The integrated U-shaped pad stabilizes the patella and eases the tension on the patellafemoral joint. At the same time, the open structure allows for the physiological gliding movement of the patella. The patella is safely guided without obstruction to the natural movement of the knee. This relieves the strain on the joint, especially around the patella, and brings pain relief. Silicone applications ensure the brace remains in position, even during long periods of activity. The breathable Sympress™ material of the brace makes for a comfortable wearing sensation.

This same material is also used in the Push med Knee Brace. While the Push care Knee Brace is ideal for pathologies regarding the patella, the Push med Knee Brace is the obvious choice for the post-operative treatment of acute traumatic knee injuries such as torn lateral ligaments. It provides substantial support to the knee joint by two non-axial leaf spring hinges. They follow the natural rotation movement in a unique way and allow an unhindered flexion and extension of the knee. Same as the Push care Knee Brace, the Push med Knee Brace strikes the perfect balance in giving optimal support and maximum freedom.

More information on the different Push knee braces can be obtained at:
Nea International bv
Tel. +31 (0)43-407 92 20
cs@push.eu

For materials in German you may also contact:
Ofa Bamberg GmbH
Ira Stütz
Tel. 0170 6314278
stuetz.ira@ofa.de

1 Wilkinson DM., Blacker SD., Richmond VL. et al. Injuries and injury risk factors among British army infantry soldiers during predeployment training. Injury Prevention 2011, 17, S. 381-387. Hauret, K. G. et al. Musculoskeletal Injuries. Description of an Under-Recognized Injury Problem Among Military Personnel. American Journal of Preventive Medicine, Volume 38, Issue 1, S. 61 - 70.

2 Taanila, H., Suni, J., Pihlajamäki, H. et al. Musculoskeletal disorders in physically active conscripts: a one-year follow-up study in the Finnish Defence Forces. BMC Musculoskelet Disord 10, 89 (2009). Kollock RO., Andrews C., Johnston A., Elliott T., Wilson AE., Games KE., Sefton JM. A Meta-Analysis to Determine if Lower Extremity Muscle Strengthening Should Be Included in Military Knee Overuse Injury-Prevention Programs. J Athl Train. 2016 Nov, 51(11), S. 919 - 926.

3 Glaviano NR., Boling MC., Fraser JJ. Anterior Knee Pain Risk Differs Between Sex and Occupation in Military Tactical Athletes. J Athl Train. 2021 Mar 31.

ofa bamberg

Stability without constraints.

push braces

Push med
Knee Brace

M3-EPS: A Surge Capacity Concept for Pandemics and Crises

Summary

The Multinational Medical Coordination Centre / European Medical Command (MMCC/EMC) in Koblenz has responded to the challenges of the global COVID-19 pandemic by developing a comprehensive modular concept for dealing with pandemics and crises. This concept comprises a total of seven modules, some of which can function independently, others only in groups. It was prepared at the request of NATO's Euro-Atlantic Disaster Response Coordination Centre (EADRCC) and was further developed and refined during the German EU Council Presidency as a European Medical Cooperation 2.0 project. The objective was to improve the response to epidemics and pandemics.

The COVID-19 pandemic has shown that stockpiles of medical material and supplies can increase the responsiveness and resilience of civilian and military health care systems. This concept is called "Military Modular Multipurpose Epidemic/Pandemic Stockpiling" (M3-EPS). It has been used to ensure the rapid material support of military medical facilities on operations, most recently for EU Battle Group II/2020. At the same time, the various modular and rapidly deployable standard packages have been further harmonised with MMCC/EMC nations.

Keywords: COVID-19, M3-EPS, MMCC/EMC, pandemic

Introduction

In late 2019, severe acute respiratory syndrome coronavirus 2 was first identified and has since led to the ongoing global COVID-19 pandemic. This pandemic has highlighted the lack of rapidly deployable reinforcement elements and systems as well as the benefits of stockpiles of medical equipment. A differentiation must be made between non-expendable medical supplies (i.e. medical devices[1]) and individually issued expendable medical supplies. The need for both expendable and non-expendable medical supplies could not be sufficiently satisfied in all areas as manufacturing nowadays is based on just-in-time practices without contingency stockpiling.

Production losses and market contractions as well as the concentration of production facilities in countries outside of Europe have in recent years frequently led to supply shortages across Europe for various drugs (including antibiotics, cytostatic agents, and vaccines). What is more, the pressure to reduce costs has in recent years led to a considerable reduction in civilian and military stockpiles of medical materials, including non-expendable medical supplies, in favour of just-in-time production.

The COVID-19 pandemic has led to an increased awareness among policymakers and the general public of pandemic and epidemic threat scenarios and their consequences.

In response to the rapid spread of COVID-19, the World Health Organization (WHO) and the Robert Koch Institute (RKI) made recommendations for improving preparations for further possible waves of COVID-19. In addition, the European Commission announced the creation of the rescEU strategic stockpile of medical equipment. (2)

The mission of the Multinational Medical Coordination Centre / European Medical Command is to support the medical services of NATO and the EU by coordinating medical capability development. One of the lessons learned in the management of major incidents, the Ebola crisis, and the current pandemic is that public health is becoming increasingly important for external and internal security.

As part of its programme of work, the MMCC/EMC was tasked in the spring of 2020 with improving cooperation between medical services and with enhancing their responsiveness so that they are better prepared for possible further COVID-19 waves, which may occur in combination with a seasonal flu epidemic.

In April 2020, the MMCC/EMC was asked by the Euro-Atlantic Disaster Response Coordination Centre (EADRCC) of NATO Headquarters in Brussels to quickly develop a concept for military medical stockpiling. This is the basis for the NATO Pandemic Response Trust Fund. Many nations have contributed financial resources and material to the trust fund on the basis of this concept. The NATO Support and Procurement Agency (NSPA) is responsible for managing the purchase and storage of trust fund items. The NATO Euro-Atlantic Disaster Response Coordination Centre helps coordinate requests for assistance from countries. In October and November 2020, the NATO member states Albania, Montenegro and North Macedonia received ventilators and medical supplies with a total value of €1.5 million.

The purpose of the M3-EPS concept developed by the MMCC/EMC is to maintain limited stockpiles to ensure surge capacity in the event of a critical development such as the COVID-19 pandemic.

The objective is to learn from the current COVID-19 pandemic so that medical services are more effectively and efficiently prepared for future epidemics and pandemics and are able to respond quickly. Rapidly deployable and modular standard packages with expendable and non-expendable medical materials are to be identified and defined for stockpiling. At the same time, the stockpiling efforts of the medical services must be supported.

1 'Medical device' means any instrument, apparatus, appliance, software, material or other article, whether used alone or in combination, including the software intended by its manufacturer to be used specifically for diagnostic and/or therapeutic purposes and necessary for its proper application, intended by the manufacturer to be used for human beings for the purpose of:
a) diagnosis, prevention, monitoring, treatment or alleviation of disease,
b) diagnosis, monitoring, treatment, alleviation of or compensation for an injury or handicap,
c) investigation, replacement or modification of the anatomy or of a physiological process,
d) control of conception, and which does not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means.

Three Phases of Development

The concept was developed in three phases:

- Phase 1: The response capability of medical forces of the multinational EU Battlegroup 2020-2 (EU-BG-2020-2) will be improved for deployment with a modular initial COVID-19 capability (focusing on self-protection) to manage the COVID-19 pandemic or a local COVID-19 outbreak.

- Phase 2: The various modular, rapidly deployable standard packages will be harmonised with the nations participating in the MMCC/EMC and – wherever possible – will be aligned with comparable stockpiling preparations of the military and civilian bodies of NATO and the EU.

- Phase 3: A multinational concept will be developed which can be used not only for deployments to manage COVID-19 but also for other infectious diseases (those caused by other pathogens).

The modular standard packages can be used to support military medical facilities in international missions, to help hospitals in Germany and the EU, and to provide assistance, including administrative support, in theatres of operation. The concept includes a calculator that is used to compute costs, storage space, and personnel requirements for each module. The calculator uses defined parameters to generate a list of generic names for essential expendable and non-expendable medical material. This list helps users determine and procure what is actually needed.

Modules

One aspect of how we can better meet the challenges of future pandemics and epidemics is the stockpiling of medicinal products, medical devices and medical equipment for specific purposes.
As M3-EPS has been developed as a surge-capacity concept for crises, it thus prioritises material from volatile supply chains. Commercially available articles whose supply is guaranteed are not given special consideration.
Appropriate modules have thus been created which can assist in the fight against pandemics. One of the lessons learned in the first wave of the COVID-19 pandemic is that such modules represent critical resources.
The M3-EPS comprises a total of seven modules, some of which can function independently, others only in groups. (See Fig. 1).
The modules can be employed to supplement medical treatment facilities and/or can build on existing medical infrastructure.
Three modules (A, C and D) require a functioning supply infrastructure and cannot be operated independently. With its expendable medical material, module G only requires suitable infrastructure. Module E can be employed independently.
In accordance with its objective, each module contains expendable and non-expendable medical material required specifically for a COVID-19 epidemic/pandemic.
The modules can also be used for epidemics and pandemics caused by other droplet infections.
The modules do not ensure the supply of, for example, electricity, water, compressed air, oxygen, and other goods and media that are required for continuous operation. Infrastructure for the disposal of material is also not included in the modules.

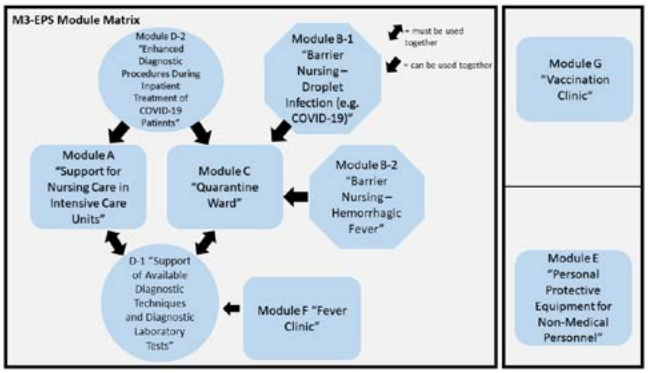


Figure 1: Module matrix and mutual dependencies

Modulmatrix M3-EPS	M3-EPS module matrix
= müssen miteinander verwendet werden	= must be used together
= können miteinander verwendet werden	= can be used together
Modul A „Unterstützung Intensivpflege auf Intensivstationen"	Module A – Support for Nursing in Intensive Care Units
Modul B-1 „Barrier-Nursing durch Tröpfcheninfektion (wie COVID-19)"	Module B-1 – Isolation Nursing for Droplet Infection (e.g. COVID-19)
Modul B-2 „Barrier-Nursing bei hämorrhagischem Fieber"	Module B-2 – Isolation Nursing for Haemorrhagic Fever
Modul C „Pflegestation COVID-19 / Quarantäne"	Module C – Quarantine Nursing Unit
Modul D-1 „Unterstützung bestehender Diagnostik und Labor"	D-1 – Support for Existing (Laboratory) Diagnostic Units
Modul D-2 „Erweiterte Diagnostik bei Stationäre Behandlung COVID-19"	Module D-2 – Additional Diagnostics in COVID-19 Inpatient Treatment
Modul E „PSA für Nicht-Sanitätspersonal"	Module E – PPE for Non-Medical Personnel
Modul F „Fieberambulanz"	Module F – Fever/Testing Clinic
Modul G „Impfambulanz"	Module G – Vaccination Clinic

Module A – Support for Nursing in Intensive Care Units

Module A must be supported by the capabilities of modules D-1 and D-2. It can be used to upgrade parts of a nursing unit to an intensive care unit or to expand or enhance an existing intensive care unit. This module features complex active medical devices as well as necessary medicinal products including anaesthetics and analgesics for treating intensive care patients. This principle of expanding the intensive care capacities of a hospital has been successfully practiced in recent months by the German and French medical services.

Figure 2: Additional highly infectious intensive care patients can be treated in module A under pandemic conditions. © Bundeswehr/EKT

Module B – Isolation Nursing

B-1 – Isolation Nursing for Droplet Infection

Module B-1 allows staff to provide medical care for non-intensive care patients, including those with COVID-19. The module includes not only hospital hygiene supplies and personal protective equipment (PPE) but also containers for safe waste disposal (further disposal methods must be ensured through the infrastructure supplied) as well as a sluice room through which to access the area in which infectious patients are being cared for. Module B-1 does not include dedicated personnel as it is a set of additional isolation nursing equipment for existing nursing units.

B-2 – Isolation Nursing for Haemorrhagic Fever

Module B-2 allows staff to provide medical care for non-intensive care patients at a significantly higher level of protection for the medical personnel.

Module C – Quarantine Nursing Unit

Module C is intended for patients with mild to moderate conditions as well as those who require hospitalisation. It includes essential equipment for a makeshift emergency nursing unit to be incorporated into existing infrastructure. The module relies on logistic support and supply from a suitable nearby medical care facility. In the event of an infectious scenario such as the COVID-19 pandemic, it can only be operated in combination with module B-1. In case of haemorrhagic fever, module B-1 must be replaced with module B-2.

Figure 1: Protective measures are in place as patients are treated in the quarantine and nursing module of the M3-EPS. © Bundeswehr/EKT

Module D-1 – COVID-19 Diagnostics

Support for Existing (Laboratory) Diagnostic Units

Module D-1 includes equipment for analysing samples for the diagnosis of, for example, COVID-19. Integrating this material into laboratory units such as a microbiological field laboratory or a biochemistry field laboratory in a Role 2/2E medical treatment facility (MTF) increases the efficiency of laboratory work and the resulting sample throughput under the appropriate conditions (laminar flow hood).

Figure 2: A lab worker performs serological and molecular biological testing.

Telemedicine facilitates the specialist supervision and advice of field laboratories. This setup makes expertise available wherever it is needed without the expert having to be physically present. It is equivalent to the mobile elements of telemicrobiology and has become an indispensable tool for laboratories on deployments abroad. In the context of the COVID-19 pandemic, for example, new testing methods and systems for diagnosing COVID-19 were implemented quickly with telemedical support.

Since subsequent waves of COVID-19 can occur simultaneously with seasonal flu infections, laboratory testing should cover flu viruses (and other respiratory pathogens) in addition to COVID-19.

Module D-2 – Additional Diagnostics in COVID-19 Inpatient Treatment

Module D-2 includes additional diagnostic equipment such as 12-lead ECG and ultrasound units for diagnostic imaging. Because module D-2 is considered a classic equipment pool, it does not include dedicated specialist personnel.

Module E – PPE for Non-Medical Personnel

Module E includes supplies of PPE and disinfectants to be issued to mission-relevant non-medical personnel. The module can be used on its own. Since not all members of the mission have the same requirements, there are two categories of users: non-medical personnel with increased requirements for greater amounts of "PPE for non-medical personnel" and non-medical personnel with reduced requirements for smaller amounts of "PPE for non-medical personnel". Hundreds of pallets of material must be stockpiled in order to maintain the mission while upholding pandemic-related protection measures. Appropriate disposal of contaminated individually issued expendable supplies has also been factored into the M3-EPS concept.

Module F – Fever/Testing Clinic

Module F covers the requirements of an outpatient testing station and depends on available infrastructure and incorporation into a diagnostic facility that includes the module D-1 capability. As an alternative, however, this unit can also be equipped with a mobile laboratory device.

Module G – Vaccination Clinic

As soon as enough vaccines are available, a large number of people will quickly have to be vaccinated by qualified personnel.

This will require large amounts of expendable materials and single-use equipment.
Module G meets this demand by including the necessary supplies for a vaccination clinic. It depends on available infrastructure. One team can consist of 16 people: two physicians specialised in general medicine, ten qualified medical assistants or nurses or independent medics as well as four assistants with basic medical skills, such as general and speciality nursing assistants.

Basis for calculating personnel requirements

The potential number of personnel required for the individual modules has been calculated. The assumption for this calculation was that modules A, C and D-1 will be operated in three eight-hour shifts per day. Shifts in module B-2 will only be six hours long to account for the particular challenges of working there. Shifts in modules F and G will be twelve hours long with two shifts per day. In crisis scenarios, shifts can be extended to two shifts of twelve hours per day or reduced to six hours to account for personal protective measures.

Calculator

The calculator is an important part of the M3-EPS concept and can quickly and effectively calculate the required amounts of material and personnel.
MMCC/EMC has developed a calculator based on Microsoft Excel to calculate the required numbers in terms of material, equipment and personnel. It is designed to be simple to use on a variety of IT platforms.
The calculator features an interface for entering operational variables which then outputs the required amounts of material and numbers of personnel. Products can only be added/amended in cooperation with the MMCC/EMC in order to prevent potential damage to some of the complex calculation formulae.
Because of the diversity of deployments, the results of the calculator can only provide an overview of needs and not an absolute definition of requirements. Final calculations of material and personnel requirements can be made based on the specifics of the mission in question.
The calculated amounts of material required must be reviewed and modified based on manufacturer specifications and medical guidelines. The figures provided by the calculator are mere reference points (particularly personnel numbers) and can be used as a basis for mission-specific planning and calculations in consultation with the MMCC/EMC.

Procurement

Initial operating capability for the German-led EU-BG-2020-2 was established based on available stockpiles of the Bundeswehr Medical Service. A range of options must be reviewed for materiel build-up in later phases. These options include externally procured services as well as third-party services through agencies (EDA/OCCAR/NSPA).
The choice of process will be affected by a number of factors, chief among them the availability of budgetary funds and the timely availability of the material and adequate storage space. Procuring base materials for the military production of pharmaceutical products could help to manage bottlenecks if certified and licensed production facilities for pharmaceutical products are available.
Quick and uniform procurement processes without predatory competition between EU states are required in order to save time. This will also facilitate frictionless mutual support as well as coordinated transfers to third parties.

Stockpiling / Storage / Transport

Another challenging aspect is that both military and civilian medical facilities and organisations have over the last three years reduced their stockpiles and that relevant infrastructure has been lost.
The correct storage and transport, particularly air transport, of material – some of which is highly sensitive – are not part of this concept. They have been thoroughly established in other applicable regulations concerning logistics management and transport of expendable and non-expendable medical supplies. The planning required for transport from the storage location to the airport of dispatch and within theatre is reflected in other established documents.

Figure 3: The various modules of the M3-EPS require additional storage space.

Storage Period and Subsequent Use

Since the range of products in storage often includes non-military items, the majority of expendable medical supplies can be returned to the medical services (stock rotation) or the civilian product lifecycle wherever possible. They can also be used in the context of disaster relief or transferred to humanitarian aid causes.
The timeframes for storage and subsequent use must be determined at the beginning of the project on the basis of potentially limited periods of usability. The expendable medical supplies in question mostly have a standard period of usability of a maximum of 18 to 24 months.
Active medical devices are somewhat more challenging as they are subject to mandatory scheduled maintenance standards that can be very material-intensive. The stockpiles of the different modules are also subject to regular inspections, both in terms of numbers and condition. Transfer of these products outside the territory covered by EU directives on medical devices requires that all relevant regulations are thoroughly reviewed. To ensure the safety of patients as well as users and third parties as much as possible, personnel must be appropriately instructed on the

use of these often highly complex medical devices. Products that cannot be made available to the public, such as antidotes against chemical warfare agents, should be validated by military pharmacies in order to extend storage and usability periods, if possible.

Conclusion and Outlook

The ongoing pandemic has highlighted not just the lack of and need for emergency elements / systems that can be deployed easily and quickly but also the benefits of stockpiling medical supplies. The goal of the M3-EPS concept is to increase the medical resilience of the European nations and NATO member states. The project also serves to actively highlight the increasingly close connections and interdependences with the civilian health care system. This increasingly contributes to the positive perception of the solidarity between nations when it comes to this issue. The military medical services should not take on tasks of civilian agencies responsible for medical civil protection, however. Harmonising the stockpiling and resilience-building efforts of the civilian and military health care systems, however, is a positive and productive effort to put both systems in a position to better support each other in a crisis. As part of civil-military cooperation, the MMCC/EMC aims to make an important contribution to such efforts.
The common goal is to develop and maintain easily deployable medical surge capacities through innovative stockpiling in order to be better prepared for future epidemics and pandemics. In recent years, priority access to and stockpiling of medical supplies has been drastically reduced in order to cut costs. In the course of further concept development, options and opportunities for multinational, standardised pre-positioning can be analysed. Binational and multinational warehousing solutions may also be reviewed. Stockpiling as part of preparing for a pandemic as per the M3-EPS concept also requires considerably greater resources. The concept has already been shared with NATO and the EU as well as their member states, and modules have been planned based on those established by the MMCC/EMC. The M3-EPS project and its implementation can supplement these multinational modules. Any potential duplications are uncritical since all modules can be used independently and, if necessary, can become all the more effective when combined.
Initial procurements for NATO and the EU have already been implemented based on this concept.

References with the author

Author:
Rico Maderthoner
Commander j.g. (OF-3) DEU Navy
MMCC/EMC
Coordination of Public Affairs
Andernacher Str. 100, 56070 Koblenz

Advertorial

The need for a comprehensive strategic pandemic plan

The Corona pandemic has not only shown, how vulnerable our health and economy are, but also the intensity of a security policy impact. Suddenly we realise how dependent we have become on medical supplies from certain regions of the world and the political pressure we can be subjected to. In the past, end users only have chosen the cheapest personal protective equipment (PPE) and did not pay enough attention to quality features. The consequence was, that European manufacturers in particular stopped producing or we saw how logistics can collapse in a pandemic. Even the internal market of the EU was at times so disrupted that PPE could not be shipped between EU countries without problems. The necessity to built-up a pandemic stockpile, was often not carried out, due to cost considerations in the past. The Corona pandemic now proofs, that the lack of pandemic stockpiles is often more costly, than setting them up. However, costs can be minimised by stockpiling high-quality PPE, that fits perfectly into the individual strategic pandemic plan.
What do we learn from this pandemic? Just as there are strategic oil and natural gas reserves, it is imperative, to have stocks for an event of a pandemic, in order to react quickly in an emergency situation.
This comprehensive plan must set up high quality standards for PPE, medical equipment, infrastructure and organisation. For example, FFP masks or nitrile gloves must be certified both according to the medical device standard and PPE, as well as having at least a shelf life of five years. So far, the market has focused itself only on PPE standards. Medical standards however, have e.g. much stricter rules regarding traceability and product recall. All items must fit perfectly into the overall strategic pandemic plan like a mosaic. The pandemic stockpile must not be geared solely to coronaviruses, but has to cover more severe worst-case scenarios in order to avoid severe Problems.
EU Standards should only be seen as a minimum requirement, because they are insufficiant due to fundemental weaknesses. Two notified bodies in the EU, can have not comperable and different results. The application e.g. of the standard for FFP masks acc. to EN 149:2001+A1:2009, as an essential part of the enforcement regulation acc. to PPE Norm (EN 216/425 d.R), shows quite massive weaknesses in the qualitative classification of the products for the user. Numerous inspections of already approved masks (CE) brought the truth to light, because they failed. Especially the leakage test, as part of the EN 149, needs an urgent revision and harmonisation of the execution of this test within the standardisation committees. Nearly useless FFP masks can be the result of leakages, where unfiltered air is inhaled, because the mask doesn't fit tight e.g. due to different head types in reality. Especially FFP cup masks or FFP masks with ear straps don't fit tight to different types of heads and have the highest risk for leakages. However, especially these masks are most common among the population. There is a profound safety reason, why hospitals often prefer FFP masks in fish-mouth design, with at least three or better even more adjustable areas that have a headband. Thus among other things, the leakage test is also carried out by the

Shutterstock, Nr: 1724301958, Autor: Andy Dean Photography

various approved testing institutes individually according to their own testing criteria and not by common ones. Some institutes have certainly come under criticism for this, and rightly so. People's lives are being treated too lightly here in order to achieve a quick test.

For example, the breathing resistance test, part 1 of EN 149, already offers a much better definition of the equipment to be used for the test, but still leaves room for too many errors. The fit of the mask on the test head, as well as the way and arrangement of the airflow opening can very quickly produce completely different results with the same mask.

The PPE standard itself, as the experience of the pandemic shows, has also shown weaknesses as an overriding legal standard. Consumers are lost because of unclear labelling, shelf-life requirements and packaging declarations. Only through massive public criticism and state-controlled improvement of all measures, consumers were able to regain confidence in market supervision. The greatest weakness was the non-existent or inadequate expertise of the market surveillance authorities of the states, the federal government and the European Union. To this day, too little has been done to ensure the market and product safety in the long term.

What remains is to trust your suppliers and to learn to appreciate their transparency, when dealing with protective equipment.

When we go in detail, there are even more aspects to be taken into consideration, such as not wearing out head straps or exact technical values of the used meltblown fleece. This is supposed to filter viruses and should offer a low breathing resistance, so longterm wearing is comfortable. Especially with meltblown fleeces, massive differences can occur with cheap manufacturers, because they can't guarantee a consistent quality or use other materials instead of meltblown.

A strategic pandemic plan should also include topics such as BSL 4 high-security laboratories, where extensive tests with highly dangerous viruses, but also product testing can be carried out in-house. Making oneself independent of the testing capacities of notified bodies is crucial, as they were completely overloaded during the Corona pandemic and the tests are not completely comparable due to gaps in EU norms like stated above.

The overall concept must be rounded off by more extensive capacities in mobile hospitals and the possibility of producing medical oxygen oneself, e.g. through ultra-modern and mobile systems in the size of a trolley.

Who can be a reliable know-how partner? In the past, world-renowned large consulting companies were often hired to advise government institutions during the pandemic. Unfortunately they don't have the profound know-how of a long-term professional manufacturer with practical experience in all aspects of a pandemic. The problems during the pandemic have proven the insufficiency of them.

The expertise of a company can't be proven by just delivering items. A unique expertise needs to accompany the strategic customer targets along all aspects of the strategy and not just parts of it. A profound know-how of products, raw materials, standards and practical problems is necessary to be able to assess the suitability of each aspect to the overall strategic pandemic plan. A manufacturer for example such as german ercelliance, which offers pandemic protection products, healthcare consulting, BSL4 laboratories, mobile hospital solutions and highly compact O2 production systems such as the GEPOS system, can provide the certainty that everything is perfectly matched. This accelerates the implementation of the plan and saves costs.

Author:
Harun Özkalp
Managing Director
german ercelliance GmbH
sales@ercelliance.com
Hans-Henny-Jahnn Weg 53, 22085 Hamburg, Germany

Individual Innovative Medical Solutions
Make the seemingly impossible, possible

german ercelliance

Strategic pandemic solutions – made in Germany

For over a decade, german ercelliance has not only been a specialist for the supply of medical products in emergencies and disasters, but also a specialist for pandemics.

Expertise is not shown by just offering products, but by providing complete healthcare solutions to achieve your strategic goals. Emergency and Disaster Medical products, mobile medical O2 production solutions, mobile hospitals and healthcare consulting are coming from a single source and are perfectly matched.

We produce FFP masks in Germany and offer PPE items, such as disinfectants, coveralls, protective goggles and our state of the art self-developed mobile solutions for medical oxygen.

You can benefit from our expertise in developing strategic pandemic plans and setting up maximum security BSL 4 laboratories. Realize your complete pandemic strategy with our in depth expertise, covering all crucial aspects.

Customized solution requirements are welcome
Contact us for your demands

MADE IN GERMANY

german ercelliance GmbH
Hans-Henny-Jahnn-Weg 53
22085 Hamburg / GERMANY

T: +49 (0)40/88 1 55 848
F: +49 (0)40/88 1 55 747
E: sales@ercelliance.com

www.ercelliance.com

Analysing Civil-Military Command and Control in the Response to the Covid-19 Pandemic

Introduction

The COVID-19 pandemic has challenged our countries and led to an unprecedented mobilisation of national resources including the use of armed forces to augment civilian health capacity. This health crisis has put immense pressure on military medical services both to ensure force health protection and health care for members of the armed forces, and to augment capacity of the civilian health system (1). This has raised the profile of the medical staff function alongside the clinical capabilities of the military medical system. It is important to consider the contribution of military medical leaders and planners to the medical command, control and liaison systems that have been established across many government ministries beyond the Ministry of Defence in order to determine whether these should be retained for the future. This paper proposes a generic 'command and control' model for interpretation of national responses in order to facilitate sharing of observations. It complements our emerging work to develop a generic taxonomy of civil-military activities in support of national response to the COVID-19 response.

Just over one year from the onset of the crisis, insights from internal reflective lessons learned processes are beginning to emerge into the public domain through presentations at conferences, academic papers and other communications. This information provides an opportunity to compare between nations and to build generic models of civil-military responses so as to provide insights that can be used to inform national and international interpretations of the crisis. This paper summarises national presentations on the military medical contribution to civil-military command and control arrangements from recent international conferences including the DiMiMED International Conference on Disaster and Military Medicine conference (16-17 Nov 20), Australasian Military Medical Association conference (25-27 Nov 20), the AMSUS Conference (6-10 Dec 2020) and the combined ICMM Regional Assembly of the Pan-Arab and Maghrebian Regional Working Groups of Military Medicine (9-10 Feb 20). This summary will provide generic insights that apply across nations, recognising that the solution selected by each nation will be the result of specific local factors.

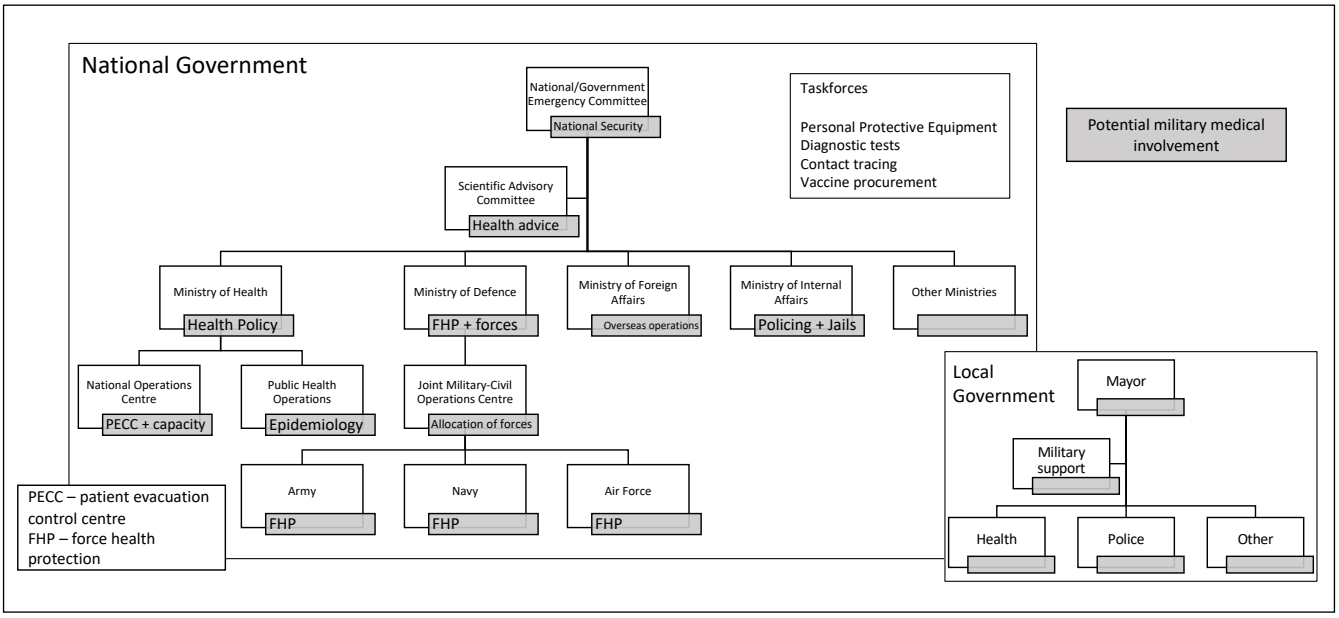
Outline to Responses to the Outbreak

There is an emerging consensus on the important contributions made by military medical services in support of national responses to the COVID-19 pandemic (2). Initially there was a short-lived burst of international emergency repatriation of citizens from outbreak zones across the world. Within countries, the first phase was focussed on the design and implementation of force health protection (FHP) measures to minimise the risk of COVID-19 to armed forces personnel that were compliant with wider national policies. This included adjusting ways of working (social distancing, working from home etc, cohort isolation) in order to maintain the minimum necessary military capability and capacity to meet essential defence tasks. The second phase was the mobilisation of military assistance to the civilian response including: procurement of personal protective equipment and other essential emergency supplies, establishing diagnostic testing and health surveillance systems, and augmenting civilian health service capacity (alongside adjusting the capabilities and maintaining the capacity of the military health system). As the first wave diminished, effort shifted to restoration of military activities through managing the risk of COVID and supporting research efforts (especially the development of COVID vaccines). Although the second wave was predicted, the severity exceeded expectations and resulted in the re-imposition of many of the control and response measures from the first wave. At the time of writing, many Western countries are anticipating a reduction in control measures as national vaccination campaigns begin to provide immunity to the most vulnerable members of their populations. Military personnel are often a vital additional source of national vaccination teams. Overall, civil-military planning across all levels of government has been an essential pre-requisite to the efficient use of military capabilities.

Command and Control – Civil-Military Medical Co-operation in COVID-19

The role, functions and capacity of medical staff branches is the subject of significant debate within military medical services (3). Allied Joint Medical Doctrine provides a description of the potential structure of a medical staff branch (4). This covers the generic staff functions (J1-9) including links to the civilian health system. During military operations, military support to civilian authorities is considered to be an option of last resort though arrangements exist for civil-military cooperation through CIMIC or UN CMCoord depending on the system for information sharing (5). Prior to the COVID-19 crisis there was an emerging debate on civil-military co-operation in managing future global public health risks, primarily focussed on the experience of South and East Asian countries (6). The reported experience from the COVID-19 response shows that the armed forces and military health system have been an integral component of national response as equal partners or leaders within countries' health economies. Thus 'humanitarian frameworks' that emphasise neutrality and operational independence as a separation between security actors and wider government actors have not been appropriate in the context of the COVID-19 crises in countries that have functional governments.

Military medical personnel have had important roles in leadership and staff appointments across government, both within Ministries of Defence, across other government ministries and specific taskforces. This has been a unique level of civil-military co-operation between different components of national health systems outside of full-scale war. This experience might provide evidence of the level of co-operation necessary during a war and might also indicate new relationships that need to be sustained after the COVID-19 crisis has subsided. Based on national briefings from the conferences described in the introduction, Figure 1



COVID Civil-Military Command and Control 'presence'

shows the potential 'points of presence' for military medical personnel across governments as shaded boxes linked to every functional component of government. These linkages have occurred at both the national (or federal) level of government (which is the normal level of civil-military collaboration) and also at the local (or regional government) level for the tactical control of military support. This distinction has been important in many countries where funding (taxation or insurance) for healthcare is a delegated function of government with the national Ministry of Health being responsible for policy, regulation and governance but not direct management of health facilities.

Most governments have established a COVID-19 response committee at the national, cross-government level, either de novo or based on existing disaster management structures. In some countries, this has been led by a senior military figure (and even the Surgeon General). This committee has the responsibility for leading and managing the whole national COVID-19 mitigation 'campaign' across all government departments. Just like in military planning, many governments have created designated national 'Taskforces', to manage discrete components of the strategic campaign plan to manage the COVID-19 pandemic. These have included procurement of PPE and essential medical supplies, diagnostic testing, contact tracing, quarantine management, and vaccine research and procurement. Many countries have also turned to military personnel to lead or augment the planning and delivery capacity of these Taskforces.

Many countries have also established a Scientific Advisory Committee to provide technical advice to the national emergency committee. Armed forces experts in medical intelligence, biological weapons research and public health may have been co-opted as members. Some nations have substantial military bio-medical research institutions that have also conducted primary research relevant to the COVID-19 pandemic covering vaccine development, therapeutics and epidemiology (especially in military populations).

Ministries of Defence often relegate their Surgeon General and medical staff branch under the personnel or logistics function. However, this health crisis has raised the prominence of the military health system and technical health advice which has created a substantial new demand for medical staff across the whole military staff structure. If not filling a national role, senior medical staff have been attending military committees at the highest level. Medical personnel and units have been a critical part of military assistance to the civil authorities. This has often been co-ordinated through a designated military-civil assistance taskforce under a designated Joint commander and operations centre (i.e. commanding army, navy and air force personnel). The commands of the Services (Army, Navy and Air Force) have had a similar demand for medical staff advice, especially in regard to COVID-19 protection measures and response to outbreaks in military units. This analysis does not consider the second order impact on the internal structure and function of the military medical services. This topic merits a discrete analysis in its own right.

The COVID-19 crisis has reinforced the importance of military health systems as a component of a country's health economy and its potential role as a source of strategic reinforcement to the civilian system (7). This contrasts with the prevailing perspective before COVID-19 that suggested that the civilian health system could be a source of strategic augmentation to the military health system during conflict through the mobilisation of military Reserve forces. All countries have had to re-configure their health system to care for patients with COVID-19, including expanding capacity and deferring care for non-COVID-19 medical conditions. Whilst intensive care capacity was the initial emphasis for most health systems, the importance of discharge pathways, nursing and social care has become increasingly relevant. Furthermore, as local health systems became overwhelmed by intense outbreaks, it became necessary to manage patient regulation at a national level, including all forms of medevac (road, rail, sea and air). This has required systems level thinking that mirrors the military approach to a concept of medical support based on pathways of

medical care (8). Military medical personnel have augmented Ministries of Health across many departmental functions and demonstrated the transferability of many components of strategic medical planning into the civilian context. This has also enabled Ministries of Health to understand the breadth and capacity of the military health system to augment the civilian sector and ensure efficient matching of military capabilities to tasks.

At the beginning of the outbreak there was a surge of military support to Ministries of Foreign Affairs to assist with the repatriation of national citizens from epicentres of COVID-19 outbreaks across the world. This included medical oversight of exposed and symptomatic patients during evacuation and quarantine. The armed forces have also provided augmentation to local authorities in overseas national territories. Support to international partner countries has become an important diplomatic tool for strategic purposes with many countries providing military to civilian and military to military medical assistance alongside pure civilian partnerships as support to the COVID-19 crisis. This type of health diplomacy might become a significant feature of international engagement into 2021 and beyond.

The final inter-ministry relationship to consider is between the Ministry of Defence and the Ministry of Internal Affairs. Many countries use their armed forces as a source of strategic reinforcement for their police and other internal security forces. Whilst this does not usually directly impact military medical services, it is worth considering some of the health implications of the COVID-19 crisis on the internal security system. The first issue is the relative risk of unmitigated exposure to the coronavirus during internal security and policing activities. This make result in officers conducting riot control, border security, prison duties or other public facing roles being at higher risk of contracting the disease compared to other government workers. The second issue is the specific responsibilities of government to mitigate the risks of COVID-19 transmission inside prisons, detention centres and other locations where individuals are held under state control. Both of these topics require designated medical advice and staff in support of these security functions.

The same breadth of military support to 'command and control' has also been seen at the local government level, especially for the tactical management of military assistance. There is even greater international variation in subordinate systems of government than at national level. The image of 'local government' in Figure 1 is purely illustrative in order to highlight the potential for additional involvement of military medical staff assistance at this level of government.

Observations

Based on the description above, civil-military co-operation at a national level and local level has been an important activity for military medical services and has required significant number of personnel to be deployed from their normal role. The image at Figure 1 might be useful as an indicative model for analysis of civil-military collaboration. This can be expanded to cover all 'points of presence' where military medical staff have provided augmentation or liaison to civil authorities. International comparisons can then identify those points of presence that have occurred in every country and those that have been unique in the context of individual countries. This process can also identify those roles that need to be maintained as the minimum military requirement for civil-military collaboration for future health or other national emergencies. It will also identify the core competencies required of military medical planners in global health and health systems so that personnel can be better trained for these roles in the next emergency.

References with the author

Author:
Lt Gen (Rtd) Professor Martin CM BricknellCB OStJ PhD DM MBA MA MedSci
Professor of Conflict, Health and Military Medicine
Conflict and Health Research Group
School of Security Studies
King's College London
LONDON WC2R 2LS

Dear Reader,

Do you already know our website Military Medical Corps Worldwide ALMANAC?

The Almanac is the only comprehensive summary of military medical services throughout the world and on our website available anytime. It accurately reflects the contemporary status of the Military Medical Services of more than 100 countries, such as the number of existing military hospitals, institutes and Armed Forces personnel.

The permanently updated portraits will be available for you, with just one click at
www.military-medicine.com/almanac

I took over as Editor-in-Chief from Dr Lutz Bandekow in Spring 2021. I would like to publicly acknowledge his tireless contribution to military medical through his dedication and would be grateful if you would also actively participate in this process. Please send any corrections, proposed alterations, additions and suggestions to the email address: martin.bricknell@military-medicine.com

With best regards,

Professor (Dr) Martin Bricknell CB OStJ PhD DM
Lieutenant General (ret)
Editor-in-Chief

WORLDWIDE MILITARY-MEDICINE.COM

Even more versatile:

- **Be excited to read through fascinating articles**
- **Find great conferences**
- **More space for information and photos**
- **Immediate updates**
- **Direct connections worldwide**

Covid-19 and the Navies: an Unexpected Passenger

Since the Cold War all big Navy vessels have been protected against CBRN (chemical, biological, radiological and nuclear) threat. They can hermetically seal themselves against the outside world and create an internal overpressure that will prevent penetration by any toxicant that might contaminate the crew. Military health services have long known that the B in CBRN can be misleading. Protection against biological risk does not mean protecting yourself against the air outside and instead generally means protecting yourself against other people, as dramatically demonstrated by the outbreaks of Covid-19 on the aircraft carriers Theodore Roosevelt and Charles de Gaulle.

The US aircraft carrier Theodore Roosevelt is based in San Diego on the Pacific Ocean. She carries a full complement of 5800 sailors but while on duty in the Western Pacific in March 2020 had a crew of 4500 to 4800. Between 5 and 9 March 2020 the Theodore Roosevelt put into Da Nang in Vietnam and this was very probably the source of the first outbreak of Covid-19 to be described on a warship. The first case of Covid-19 was declared on board on 22 March while the carrier was at sea. On 24 March three other cases were reported and all four were evacuated to Guam. The next day five new cases were also evacuated to Guam. It was then decided that all naval operations should be suspended and that the carrier should sail to the naval base at Guam. When the vessel tied up on 27 March, the crew of the Theodore Roosevelt was put into quarantine on board and was only allowed to take exercise by walking up and down the quay. At 31 March over one hundred confirmed cases of Covid-19 had been reported. US Navy authorities decided to test the entire crew and the following day to evacuate the ship. The whole naval base had to be mobilised and 1700 hotel rooms requisitioned on the island to accommodate all the sailors. The evacuation took around ten days, which the crew used to clean and disinfect the ship. At 8 April there were 416 cases of Covid-19 but still 2500 sailors on board. On 13 April the US Navy announced the only death related to the outbreak. At 5 May the entire crew had been tested at least once and a total of 2156 confirmed cases of Covid-19 had been reported. The crew's quarantine ended on 14 May and 2900 sailors returned on board. The next day another outbreak was discovered when five new cases of Covid-19 were found in sailors who had previously tested negative. These were however the last cases of the outbreak and naval operations resumed on 21 May after having been suspended for two months[1].

This outbreak, which received very heavy media coverage when Captain Brett Crozier was forced to leave his ship, acted like an electric shock on all naval forces worldwide. Ten days later it was the turn of the French Navy.

The French aircraft carrier Charles de Gaulle is based in Toulon. She carries a full complement of 1900 sailors. In April 2020 while on duty in the Mediterranean and North Atlantic there were only 1800 crew on board. Between 13 and 16 March the Charles de Gaulle was in Brest. On 29 and 30 March she was moored off the coast of Denmark and was operating a shuttle service to the land. On 5 April, while numerous suspected cases of Covid-19 were filling its medical facilities, the first confirmed case was evacuated to Denmark. On 8 April, while the Charles de Gaulle was at sea in the Bay of Biscay, another three cases of Covid-19 were evacuated to France. That same day it was decided to suspend naval operations and to return to base. The first investigative team from the French Forces Health Service (SSA) also arrived on board on 8 April. On 11 April a second SSA investigative team boarded the other ships of the Carrier Battle Group (CVBG) while they were still at sea. On 13 April the Charles de Gaulle tied up in Toulon and 90% of the crew disembarked. The only people remaining on board were the personnel needed to handle the nuclear reactor and the vessel's security and safety. The entire crew was tested for Covid-19 and of the 64% of sailors who tested positive, a very small number had to be hospitalised. There were no deaths. Sanitisation of the ship by an Army CBRN battalion (the 2nd Regiment of Dragoons) was completed in April.

There were just two weeks between these two extraordinarily similar outbreaks but the French Navy and the SSA took advantage of that time to take in US Navy feedback and improve their own investigation and control of outbreaks on board ship.

American aircraft carrier (Source : pixabay.com)

1 There is little open-source information on the impact of the epidemic on other ships in the Theodore Roosevelt CVBG (carrier battle group) and only the outbreak on the carrier itself is properly described. The same applies to the Charles de Gaulle CVBG.

Aerial view of an American naval aviation group (task force) (Source : pixabay.com)

The dramatic results of the quarantining of the Diamond Princess in Yokohama (Japan) in February 2020 was also taken into account. The French Navy and the SSA dealt with three key areas of epidemic management very differently:

- investigation of the epidemic began as soon as possible by sending specialist SSA teams out to the ships. The time saved by starting the investigation as quickly as possible was crucial in controlling the outbreak;

- as soon as the Charles de Gaulle tied up in Toulon, the entire crew was tested and evacuated, preventing a re-run of the errors made in Guam and Japan;

- sanitisation of the ship was carried out by CBRN professionals (the 2nd Regiment of Dragoons) who proved their worth in one of the most difficult environments to disinfect: the corridors of an aircraft carrier.

These Covid-19 outbreaks have however highlighted how vulnerable warships are to biological threat - in this case a natural threat, but one that can also be deliberate. The problem in such cases is not how to protect against an external threat, such as toxicants or radioactive particles, but how to protect against an infection that is already on board and whose sole purpose is to spread through the entire crew. Barrier methods, social distancing, ventilation and air conditioning systems that do not encourage the propagation of the epidemic are consequently challenges that it is almost impossible to meet in ships that have not been designed to cope with them. The isolation of contagious patients has also proved difficult, if not impossible, on board ships whose medical and crew facilities were not designed to allow this.

The two outbreaks have however shown us how to improve the management of the risk of infection in the future.

In the short term, the training of crew and officers in biological threats, not just in the CBRN sense but across the entire range of transmissible diseases, must be improved. Natural and deliberate biological threats must be included in crisis and operational continuity planning, independently of CBRN threats, which are different. These plans must include reorganising the crew during an epidemic to allow sections to be isolated, avoiding cross-contamination across the entire crew. Food, relaxation, sleeping, bathroom and work areas must be able to operate without the groups coming into contact with each other. Finally, ventilation and air conditioning systems must be adapted to cope with biological threats.

In the medium term, the naval arsenal needs to be improved during Continuous Maintenance Availability (CMAV) periods (ship's unavailability for maintenance, repair and upgrade) to enable warship infrastructure itself to deal with biological threats.
Finally, above all and over the long term, the prevention and mitigation of biological threats must now be built into the naval architecture of warships currently under development.

Transmissible diseases have long been viewed as a major threat to naval operations but the preventive health measures used for decades (hygiene, vector and pest control, vaccination, chemoprophylaxis[2] etc.) have restricted biological accidents to a few clusters of diarrhoea or acute respiratory infection, and of course sporadic instances of transmissible diseases after stops in tropical countries. The impact on operations has always been limited - at worst a 24 or 48-hour suspension of duties. The threat was therefore believed to be under control. And an understanding of the threat posed by CBRN since the Cold War has also lulled Naval commands into a false sense of security and a belief that this acronym covers the entire range of all infectious diseases. It is now clear for all to see that warships are just as vulnerable to viruses and bacteria and that warship design must anticipate the next wave of natural or deliberate epidemics. The Coronavirus pandemic will soon be followed by a viral flu pandemic and probably many others over the course of the century. Navies now understand the threat and know what to do to prevent and control it.

Note: This article includes some of the information presented in public by the author at the International Conference on Disaster and Military Medicine on 17 November 2020 (https://events.military-medicine.com/dimimed/) and was also published in French in the "Revue de la défense nationale" on 1 February 2021 (https://www.defnat.com/e-RDN/tribune.php).

Author:
Benjamin Queyriaux, MD, MPH, FFPH
Medical Director
Health Intelligence Protection Surveillance Agency (HIPS) GmbH
www.hips.agency
benjamin.queyriaux@hips.agency

2 i.e. preventive treatment to stop a disease or to stop it presenting.

AN 62 1.0 04/2019/A-E

The Best Choice for Tough Missions – C-MAC® PM Video Laryngoscope

- High-contrast images, even in bright daylight
- Completely watertight (IPX8)
- Display with 160° wide-view angle

STORZ
KARL STORZ — ENDOSKOPE
THE DIAMOND STANDARD

KARL STORZ SE & Co. KG, Dr.-Karl-Storz-Straße 34, 78532 Tuttlingen/Germany, **www.karlstorz.com**

Management of critical bleeding with TRAUMA BANDAGE and TRAUMA-BOX® "made in Switzerland"

With 150 years' experience in wound care, the Swiss-based IVF HARTMANN AG has now launched a new medical device and new set for trauma care. This once again confirms the cliché that Swiss are innovative and provide the highest quality.

IVF HARTMANN AG, the Swiss subsidiary of PAUL HARTMANN AG, has been supplying the Swiss military with the "IVP" (individual bandage pack) pressure bandage for decades. However, an innovative successor of the popular IVP has now been launched: the TRAUMA BANDAGE. A first-aid kit, known as the TRAUMA-BOX®, was also developed. This can be placed in sites with high risk of traumatic injuries and applied by everyone to save lives.

The TRAUMA BANDAGE

In life-threatening situations, stopping bleeding in a fast and efficient way can be a matter of life or death. The TRAUMA BANDAGE was developed with exactly this purpose in mind: It can be applied easily and stops bleeding by exerting pressure on the wound. The biggest difference to other emergency bandages is in the new, patent-pending pressure applicator. On the one hand, it facilitates easy application, as the bandage can be thread through from both sides. On the other hand, its comparably large surface area enables a targeted and even build-up of pressure across the entire pressure plate. A test commissioned by the manufacturer and conducted by the Swiss EMPA (Federal Laboratories for Materials Science and Technology) observed that the TRAUMA BANDAGE ensures more even pressure distribution across a larger area than the Israeli bandage (emergency bandage). The pressure values in the entire area of the TRAUMA BANDAGE's pressure applicator were mostly between 75 and 150 mmHg. The pressure profile of the emergency bandage showed two pressure points with over 240 mmHg at the ends of the pressure bar and a pressure range between 112 and 180 mmHg below the smaller area of the pressure bar; the adjacent areas showed a sharp decrease in pressure.[1]

HARTMANN's proven Zetuvit® wound dressing acts as an absorbent pad. This supports rapid blood absorption and does not stick to the wound. It is attached opposite the pressure applicator, thereby making it easy to use. The TRAUMA BANDAGE is available in three widths (10, 15 and 20 cm), with the Zetuvit® wound dressing adapting to these widths.

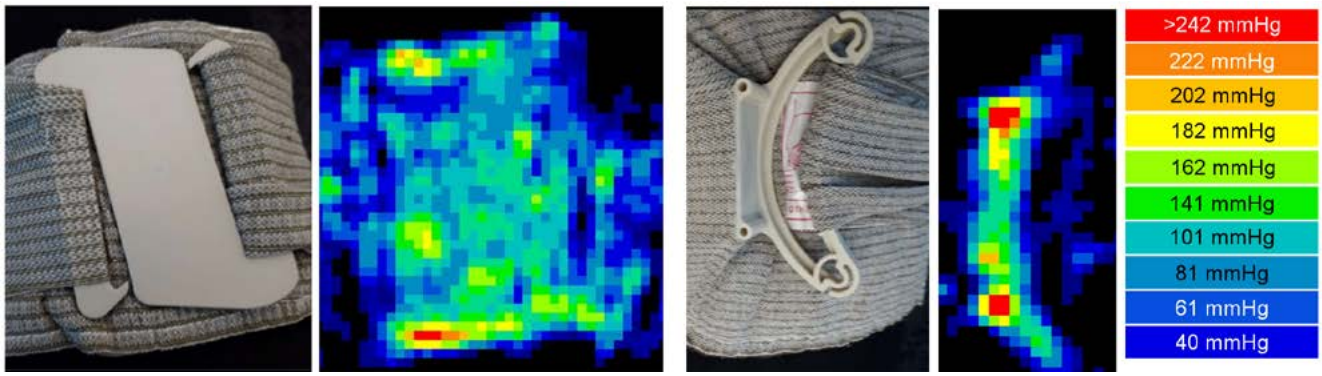
The elastic long-stretch bandage has a high cotton content of about 65%. A loop at the start of the bandage enables one-handed use for self-care. It also has several unroll stops to prevent inadvertent unrolling and enable hygienic application. The TRAUMA BANDAGE can be flexibly used on various parts of the body due to its 4.5-metre length.

At the end of the bandage, there is a closure clip to easily fix the bandage after successful application. Additional pressure could theoretically be built up by turning the closure clip, but this is not necessary, since there is sufficient pressure if the pressure applicator and long-stretch bandage are used correctly.

One highlight is the compact size of the packaged TRAUMA BANDAGE: It is packaged in a moisture-tight and gas-tight aluminium composite film and vacuum-packed to the smallest possible size. The class I medical device is sterilised using radiation. The large tear tab on the back allows for easy opening, even with just one hand and gloves.

Pictograms on the front of the package explain how to apply the TRAUMA BANDAGE, which means that both specialists and non-experts can apply the pressure bandage. A usability test showed that 95% of non-expert users were also able to correctly apply the TRAUMA BANDAGE with just one hand.[2]

With 150 years' expertise in wound care, IVF HARTMANN AG developed the TRAUMA BANDAGE in Switzerland and produces it at the site in Neuhausen am Rheinfall according to the highest standards. Although the TRAUMA BANDAGE in its current form has only been available since August 2020, it has already been used in Switzerland and across the world, including in Germany, Sweden, Armenia and many other countries.



Representative pressure distribution of the TRAUMA BANDAGE (left) and Israeli bandage (right). (Source: IVF HARTMANN AG)

1 Clinical Evaluation Report 2019, data on file
2 Usability Report 2019, data on file

The TRAUMA BANDAGE with its innovative pressure applicator (Source: IVF HARTMANN AG)

And that's not all: the TRAUMA BANDAGE is also part of the TRAUMA-BOX®.

The TRAUMA-BOX®

Although the horrors of the terror attacks were somewhat overshadowed by the corona pandemic, we were sadly not spared last year either: The year 2020 started with a knife attack in Villejuif near Paris, and unfortunately this was not the last: Other attacks occurred in London, Hanau, Dresden and Vienna. As sad as it is, similar to the corona pandemic, we will not be able to eliminate this danger completely and will have to live with it. What we have to do instead is to minimise the damage and save lives. This is exactly why the TRAUMA-BOX® was developed.

First-aid treatment of injured persons, which can be applied easily and by everyone, can be crucial for saving lives. This is where the TRAUMA-BOX® comes in: It contains selected medical devices to stop bleeding until medical assistance arrives, and can also be applied by non-experts in case of emergency. It was developed by IVF HARTMANN in collaboration with the German Trauma Foundation with a goal in mind: stop bleeding and save lives!

The TRAUMA-BOX® dispenser should be placed where crowds occur in a highly visible area and made accessible to everyone, so that passersby can always provide first aid quickly in case of emergency. The dispenser is weatherproof and protected against vandalism, is highly visible and easy to open to access the TRAUMA-BOX® bag in emergencies. This bag consists of two separate compartments. Both contain disposable medical gloves so that first aiders can protect themselves. The left compartment holds the TRAUMA BANDAGE pressure bandage presented above. For all cases in which the TRAUMA BANDAGE is not sufficient in stopping bleeding, the right compartment contains the well-known and long esteemed C-A-T Gen7 Tourniquet. The simple instructions on the bag also enable non-experts to provide first aid immediately. The TRAUMA-BOX® bag is available on its own or in the set with the robust dispenser incl. wall mount.

The TRAUMA-BOX® bag: The left compartment contains gloves and the TRAUMA BANDAGE, while the right compartment holds gloves and the C-A-T Tourniquet (Source: IVF HARTMANN AG)

The robust TRAUMA-BOX® dispenser. (Source: IVF HARTMANN AG)

The TRAUMA-BOX® has been on the market for slightly more than one year and already offers added safety in many industrial companies. The TRAUMA-BOX® bags are also already being used by the emergency services, such as Ulm city police, as police officers are often the first to arrive at the scene of the injury. In addition, they are often on their own, as rescue services are not allowed to enter an unsafe danger zone.

The first vice president of the German Trauma Foundation, Univ. Prof. Dr. med. Florian Gebhard, highlights the importance of the TRAUMA-BOX®: "Bleeding to death is the number one cause of death in many accidents and attacks. The immediate availability of a simple set to stop severe bleeding means survival for each individual affected. The comprehensive availability of the TRAUMA-BOX® will provide medical care to the severely injured anytime and anywhere." This statement is also supported by Prof. Dr. Helm, OTA, Member of the executive committee of the German Trauma Foundation: "Bleeding to death is one of the main causes of death by injuries. As such, measures to stop bleeding have a high priority. The TRAUMA-BOX® also enables non-experts to quickly and effectively prevent someone from bleeding to death."

Further information on the TRAUMA BANDAGE and TRAUMA-BOX® can be found on trauma-equipment.ch and you can request a non-binding quote on traumabandage@hartmann.info.

IVF HARTMANN AG
Victor-von-Bruns Straße 28
CH-8212 Neuhausen am Rheinfall
www.ivf.hartmann.info

American–German partnership on a regimental level

2011–2021, a review of ten years

Introduction

Why writing an article about an American – German military medical partnership in a magazine that is focusing more on the European engagements in this topic? The answer is easy, because the United States (US) Forces are already in Germany, for example with the LANDSTUHL Regional Medical Center (LMRC). This can´t be moved and most likely the US medical service will play a role in any European military scenario and if it will be only humanitarian aid. So there is an existing partnership on this level with the central military hospital of the Bundeswehr in KOBLENZ. Why not doing this with the medical, tactical units of both nations?
The US Army is providing tactical, medical units of the size of battalions stationed in the KAISERSLAUTERN area in the federal state of RHEINLAND-PFALZ. The former German Sanitätsregiment 22 (SanRgt 22; Med Rgt) "Westfalen" was responsible for the medical support of the civil-defense in this area and so also part of the host nation support for the US forces there. These reasons were the foundation of a unit partnership between the SanRgt 22 stationed in AHLEN and the 212th Combat Support Hospital (212th CSH) from SEMBACH. Besides it should be mentioned, that there was a close partnership with the United Kingdom (UK) 1st Armored Medical Regiment (Armd Med Rgt) at that time stationed in MÜNSTER. After the partnership with the 212th CSH was officialized, there had been a lot of little events on platoon level to train military skills together. The leader's agreed, that this is not enough for a prosperous partnership of medical units. So the idea of a tri-national, joint medical exercise was born.

Field Training Exercise (FTX) BLUE TRAVEL 2011

The plan of the German lead exercise was to have as infrastructure a German modular medical rescue center (MRC) (NATO role 2 enhanced) with a structural attached US operating room (OR)-section. The MRC should be bi-national manned preferably as mixed teams. Here the focus was on the emergency medical treatment (EMT) section. One UK and German medical evacuation (MEDEVAC) platoon provided ground transportation, also in mixed teams. The tactical medical evacuation (TACMEDEVAC) with a UH-60 BLACKHAWK was done by the US. All supporting elements like exercise control (EXCON), role players, communications, fuel, water and life support in the WESTFALEN-Kaserne was provided by SanRgt 22 with help of attached units. The pharmacy was, by purpose, an American-German joint concept to get the participants train with uncommon medical articles. Adjacent pre-training, small arms shooting and leisure activities in the barracks and sightseeing tours were planned. To realize this challenge, a suitable space for the setup had to be found, not easy in a highly populated area. In the neighboring city of HAMM was a non–active coalmine with its empty coal storage field that complied the demands. After granting permission to use it, the ground had to be straightened out by an engineer unit. The setup began and showed several difficulties, for instance the different voltage being used for the medical equipment or to attach the different tentage. All was managed, sometimes by troop solutions.

Rescue Center Role 2E FTX BLUE TRAVEL 2011
(Source: MSG Stephan Mewes, Bundeswehr)

The actual medical treatment became a challenge not only because the working language was English, a novelty for the majority of the staff. As long as the subunits were not mixed, just the outcome was judgeable. But with the mixed teams the different approach, based on educational standards, legal guidelines, use of equipment and existing standing operating procedures (SOPs) were inevitable. For example the training level of "Physician Assistant" (PA), common in the US, is just being implemented in Germany. That created a lack on the German side and was filled with physicians. The stringent following of SOPs, done by the US PAs, was another lesson learned. But with a strong willingness of working together, for the sake of the patient, the outcome was magnificent. After two days the teams worked together as having done so all the time. Of course in one exercise not all upcoming problems can be solved, so the leaders were convinced to keep up the multi-national exercises for the future. Because of the huge personnel and material effort of this size and other engagements of the partners, this will not be manageable in a yearly routine. In the meantime it should be worked on a smaller training level.

FTX RHINO SERPENT 2012

This exercise could be seen as a follow up of the previous one in 2011. This time it was tri-national in all medical levels. The UK provided the SENNELAGER Training Area and had the overall planning and EXCON. As medical units they were bringing in MEDEVAC assets and personnel from the 202nd Field Hospital (UK), a reserve unit. The US 212th CSH did the solely hospital setup with field accommodation. From SanRgt 22 the contribution were a MEDEVAC platoon and a surgical team. Again the working together was in mixed teams. Now there were three nations around the OR table. Again the output was very efficient and the comradeship high. Leaders were convinced that the multinational approach will be the future in military medicine.

New formation and US-Partners

Due to the structural changes in the German Joint Medical Service, the SanRgt 22 in AHLEN and the Lazarett Regiment 21 (Laz-

American-German MEDEVAC hand over
(Source: MSG Stephan Mewes, Bundeswehr)

Rgt 21; Field Hospital Rgt) in RENNEROD were decommissioned. Out of them the SanRgt 2 "Westerwald" with HQ and one battalion equivalent in RENNEROD and a second in KOBLENZ was formed. With that the established partnerships were handed over to the SanRgt 2. Soon after the UK left with nearly all their troops GERMANY, the 1st Armd Med Rgt (UK) was leaving their last garrison in SENNELAGER and being decommissioned. Unfortunately this partner was gone. Growing in size and changing structure, there was a need for SanRgt 2 to renew their US partnerships. With willingness on both sides the partnership with the active units of the SanRgt 2 and the US Army 30th MED BDE and his subunits 212th CSH and 421st Multifunctional Medical Battalion (MMB) was officially signed with a public ceremony on the 24.08.2019. With the restructuring, SanRgt 2 received two full reserve companies, the 5th and 10th. The 5th SanRgt 2, stationed in RENNEROD, established an official partnership with the US Army Medical Support Unit-Europe (MSU-E), stationed in KAISERSLAUTERN being also a reserve unit. They undertook some small, combined exercises on company (Coy) level ahead of this.

Partnership Ceremony 30th MED BDE – SanRgt 2
(Source: SanRgt 2, Bundeswehr)

MedEx WEUFOR 2018 / BLUE CHALLENGE 2019

These were two exercises having one active and two reserve (5./SanRgt 2 and MSU-E) Coy training the patient flow from the point of incidence (POI) up to Role 2B treatment in a field setup in the ALSBERG-KASERNE. 2018 it was highlighted by the visit of the Inspector General of the Bundeswehr and the Surgeon General with their very positive acknowledgment of the partnership. An exercise 2019 was shown to the public during a garrison-day in RENNEROD.

US FTX DEFENDER 2020/2021 and the CoVid-19 pandemic

In 2020, unfortunately with the intensifying of the CoVid-19 pandemic, the planned participation of physicians of the 5./SanRgt 2, being embedded in the 212th CSH, had to be cancelled. For the year 2021 the US FTX DEFENDER 21 is to hold place in the south-eastern NATO region of Europe. Facing the same pandemic difficulties in the execution, the medical part of the exercise is transferred to the area of the BAUMHOLDER training ground. With the invitation of the 30th MED BDE to join this exercise, SanRgt 2 is in the planning to contribute with physicians in the newly formed 519th Hospital Center (HC) and units in EXCON and MEDEVAC.

Exemplary outlook for the partnership

With its planned setup of a permanent training center for MEDEVAC up to Role 3, 30th MED BDE is giving a great opportunity to do combined training on a small level. With medical expertise from both sides it will be possible to develop combined SOPs and create effective structures for an efficient treatment of our patients.

Author:
Dr. Marcus Nolte, COL (MD)
OF-5./SanRgt 2 "Westerwald"
Alsberg Kaserne
Rennerod

Medical Implications of Absence of Combustion in Tobacco Heating Systems

1. Combustion and HPHC reduction

Decades of epidemiological data show that smoking causes a number of serious diseases (including cardiovascular diseases, lung cancer, and chronic obstructive pulmonary disease [COPD]), and according to the World Health Organization, nearly eight million deaths can be attributed to tobacco smoking annually. The primary cause of smoking-related disease is the high number and level of harmful and potentially harmful constituents (HPHC) formed during combustion of tobacco.

Combustion is the process of burning something, and it requires three elements: a fuel source, like tobacco; oxygen, found in air; and enough heat to kick start the self-sustaining, heat-generating reaction. During the puffing of a cigarette, the temperature increases to more than 800°C at the tip, leading to combustion of tobacco. This results in the generation of smoke (containing high levels of HPHCs, including carbon monoxide, formaldehyde, and benzene, for example), heat, and ash. Some of the toxicants emitted during combustion form liquid and solid particles that, together with the rest of the emissions, result in smoke, which is harmful to health if inhaled.

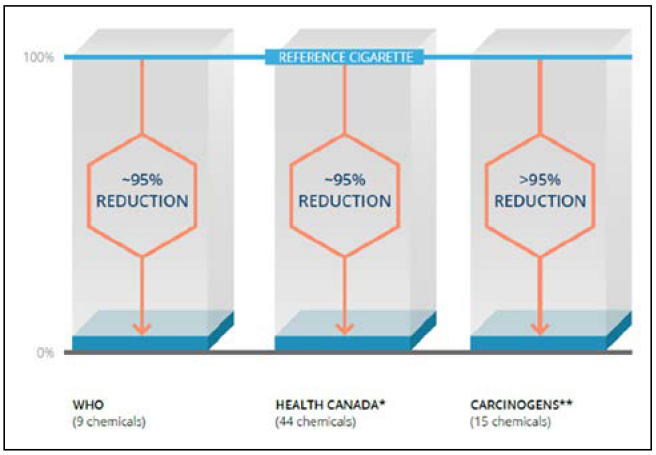
Smoking cessation is clearly the most effective way for current tobacco smokers to reduce their risk of harm and disease. Millions of smokers every year decide that they don't want cigarettes in their lives anymore and they quit smoking completely. Still, there are many men and women who do not quit smoking and continue using nicotine and tobacco products. We need to offer them alternatives they can switch to. They are looking for similar taste, ritual, and nicotine uptake as those of cigarettes, but without the smoke. Thanks to technological advancements in smoke-free products, these experiences can be delivered without tobacco combustion, thus potentially resulting in less toxic emissions compared to combustible cigarettes. Heated tobacco products (HTP) represent one of these new product categories. Philip Morris International (PMI) launched the first of the current generation of HTPs in 2014, developed as Tobacco Heating System (THS; version number, 2.2, for example), which is now commercialized under the IQOS® brand name. British American Tobacco (BAT) launched "glo" in 2016, and Korean Tobacco and Ginseng (KT&G) entered the HTP market with the launch of "lil" in 2017. Japan Tobacco (JT) launched the HTP "ploom" in 2016.

THS 2.2 relies on an electrically controlled heating technology that warms up a blade, which in turn heats the tobacco stick while, at the same time, measuring and controlling the temperature of the tobacco. This temperature is maintained below 350°C, so that the tobacco doesn't even come close to burning. It is still necessary to heat the tobacco to release nicotine and flavors. The absence of combustion has been scientifically demonstrated, and independently confirmed, in experiments showing that the chemical composition of THS aerosol in an oxygen-containing environment is similar to that in an all-nitrogen environment, where burning is impossible. Scientific studies also support that the aerosol generated by THS does not contain the solid particles that are produced when tobacco is burned. Thus, THS generates an aerosol that contains liquid droplets and gas but no carbon-based solid nanoparticles.

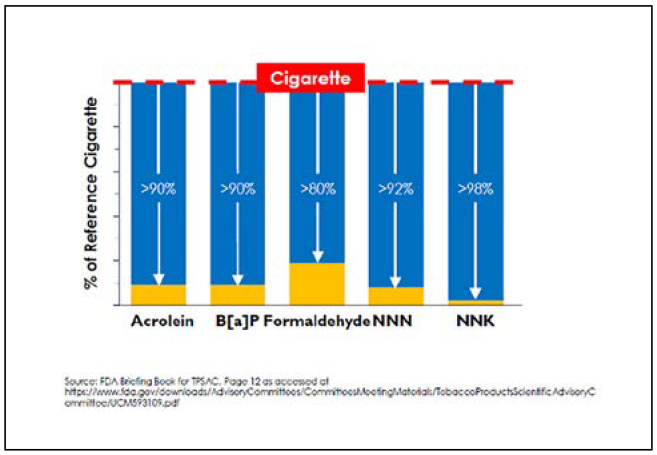
The absence of combustion in the tobacco stick during THS use and the fact that THS aerosol is not smoke have been validated by leading scientific experts in the fields of combustion, fire safety, and thermochemistry from numerous countries, including Germany, Italy, the United Kingdom (UK), Japan, Poland, the United States (US), Australia, and Switzerland as well as by an independent research organization in New Zealand. A small clinical study conducted by the Università di Catania, Italy, has also confirmed the absence of combustion in THS. This study found that, in contrast to cigarettes, the carbon monoxide levels in exhaled breath were not elevated in the study participants after use of either of two HTP products. The authors concluded that "there is no combustion in iQOS and GLO".

By avoiding combustion, THS generates an aerosol that contains significantly fewer harmful chemicals, and the levels of the harmful chemicals that are nevertheless found are reduced by an average of 95% in THS aerosol (compared to those measured in the smoke of a reference cigarette (excluding nicotine, which remains at a comparable level). Importantly, relative to smoke from a cigarette, the levels of IARC (International Agency for Research on Cancer) group 1 carcinogens (i.e., agents that are carcinogenic to humans) are reduced on average by over 95% in THS aerosol. THS also emits >94% lower levels of free radicals and 85% lower levels of reactive oxygen species than cigarettes.

The significant reduction in HPHCs in THS aerosol has also been confirmed by various public health authorities and independent laboratories around the world. For example, in April 2019, the US Food and Drug Administration (FDA) Center of Tobacco Products (CTP) issued a marketing order for PMI's IQOS Tobacco Heating System, to allow its introduction in the US market. In its scientific review, the FDA "found that the aerosol produced by the product under consideration 'contains fewer toxic chemicals than cigarette smoke,' and many of the toxins identified are present at lower levels than in cigarette smoke. For example, the carbon monoxide exposure [resulting from this product] is comparable to environmental exposure, and levels of acrolein and formaldehyde are 89% to 95% and 66% to 91% lower than from combustible cigarettes, respectively". The agency issued the marketing order along with the Technical Project Lead Review (TPL), summarizing the FDA's decision and the scientific basis for this decision. Later, in July 2020, the FDA authorized the marketing of IQOS as a modified risk tobacco product (MRTP) with reduced exposure to harmful chemicals information, i.e., a product that will or is expected to benefit the health of the population as a whole. After having completed its review of PMI's evidence package – and in-



THS aerosol contains significantly lower levels of harmful chemicals than smoke from a standard reference cigarette. (From: PMI Science Booklet https://pmiscienceprd.s3-eu-west-1.amazonaws.com/PMIScience_eBooklet/index.html)- already presented externally



FDA's Sotheast Tobacco Laboratory (STL) tested IQOS in October 2017

Note:
- Intense Health Canada's Smoking Regime
- Comparison on a per-stick basis: Excludes Nicotine, Glycerin and Total Particulate Matter

dependent studies, the US FDA decided that IQOS could be marketed in the US with the following information 1. The IQOS system heats tobacco but does not burn it; 2. This significantly reduces the production of harmful and potentially harmful chemicals; and 3. Scientific studies have shown that switching completely from conventional cigarettes to the IQOS system reduces your body's exposure to harmful or potentially harmful chemicals .

The German Federal Institute for Risk Assessment (BfR) also conducted independent analysis of THS and found that the "…levels of major carcinogens are markedly reduced in the emissions of the analyzed [heat not burn] product in relation to the conventional tobacco cigarettes and that monitoring these emissions using standardized machine smoking procedures generates reliable and reproducible data which provide a useful basis to assess exposure and human health risks".

In 2018, the Korea Ministry of Food and Drug Safety (MFDS) confirmed that the average reduction in the levels of nine HPHCs in aerosols generated by three HTPs (IQOS, glo, and lil) exceeded 90% relative to the levels in smoke generated by five of Korea's most frequently sold cigarette brands.

Peer-reviewed research on existing HTPs available in various markets confirms the reduction in the number and levels of HPHCs. This is in line with the statement from Public Health England (PHE) that, compared to cigarettes, "heated tobacco products are likely to expose users and bystanders to lower levels of particulate matter and harmful and potentially harmful compounds (HPHC)". In summary, the totality of the available scientific evidence demonstrates that, unlike a cigarette, the THS heats and does not burn tobacco; this causes a drastic reduction in HPHC numbers and levels in THS aerosol relative to the smoke of a reference cigarette. Therefore, and while THS is not risk free and provides nicotine, which is addictive, it reduces the exposure to toxicants (HPHCs, free radicals, and carbon-based nanoparticles) in smokers who switch from cigarette smoking to THS use.

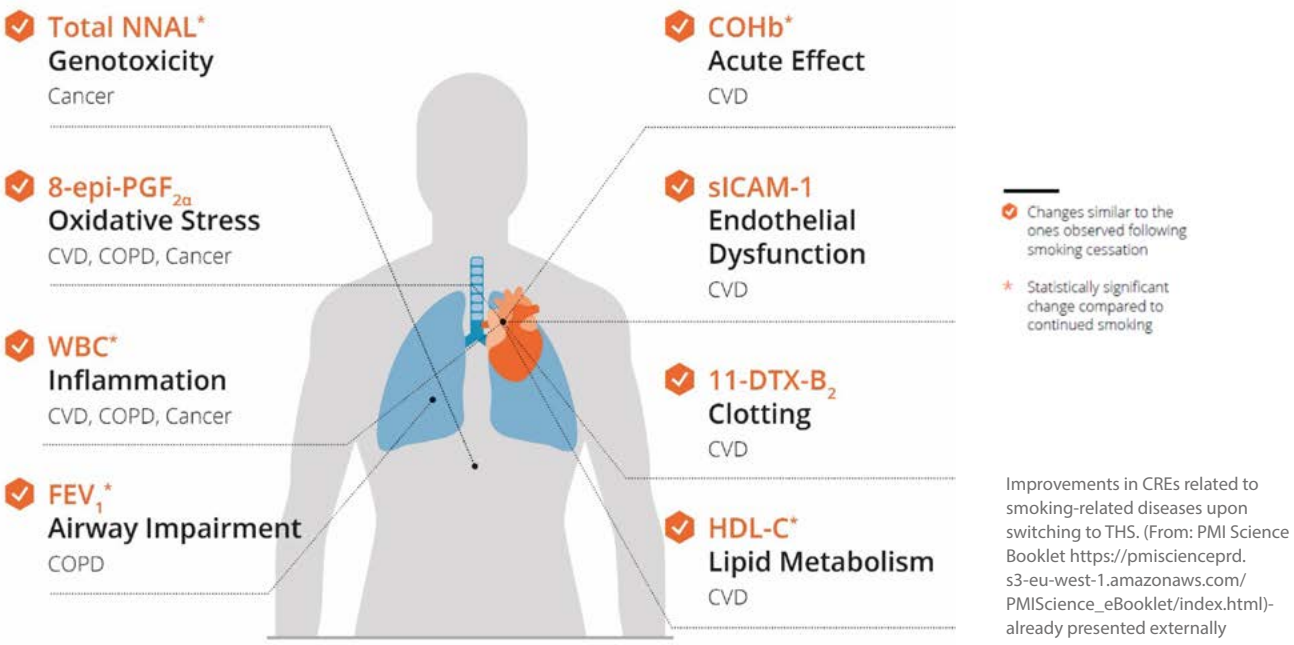
2. Medical implications

Several clinical studies have assessed whether the reduction in HPHC formation in THS aerosol also leads to a reduction in toxicant exposure when an adult current tobacco smoker switches to the product and thus also lead to a beneficial effect on that person's health profile.

In a 5-day exposure clinical study conducted in healthy subjects in Poland, researchers measured blood and urine biomarkers that represent exposure to selected HPHCs. These biomarkers of exposure, except those associated with nicotine exposure, were significantly reduced in the THS group relative to the combustible cigarette group and approached the levels observed in the smoking abstinence group.

90 days reduced exposure ambulatory clinical study in Japan and the US (which started with 5 days in confinement) showed that the levels of these biomarkers of exposure in participants who switched completely to THS were comparable with the levels in those who quit smoking for the study duration. In both cases, the levels remained significantly below those observed in subjects who continued smoking during the study.

Similarly, clinical studies by BAT and JTI found that healthy Japanese HTP users had reduced levels of biomarkers of exposure relative to cigarette smokers . Similar results were also reported in a recent clinical study in controlled ambulatory settings in the UK. The reduced exposure to HPHCs may have a positive impact on smokers' health, as demonstrated in a 6-month clinical study in a US population. A set of 8 clinical risk endpoints (CREs, i.e., measures of biological response) were selected, as they are known to be negatively affected by smoking and are expected to improve upon cessation. These CREs reflect various mechanistic pathways (lipid metabolism, endothelial function, inflammation, oxygen delivery, oxidative stress, lung function, platelet function, and carcinogenesis) that are associated with smoking-related diseases, such as cardiovascular disease, respiratory disease, and lung



Improvements in CREs related to smoking-related diseases upon switching to THS. (From: PMI Science Booklet https://pmiscienceprd.s3-eu-west-1.amazonaws.com/PMIScience_eBooklet/index.html)- already presented externally

cancer. After switching from smoking to THS for 6 months, all biomarkers showed favorable changes in the same direction as that with smoking cessation, and smokers who predominantly used THS showed favorable biological effects relative to those who continued smoking, with similar nicotine levels in both groups.

The effect of reduced exposure to HPHCs on cardiovascular parameters has been analyzed by an Italian research group at the Sapienza University. The study reported that THS had less impact than an e-cigarette and cigarettes on soluble Nox2-derived peptide, 8-iso-prostaglandin F2α-III, and vitamin E levels. Furthermore, THS and e-cigarette use had a less effect than cigarette smoking on flow-mediated dilation, H2O2 levels, H2O2 breakdown activity, soluble CD 40 ligand levels, and soluble P-selectin levels as well as blood pressure. This study demonstrated that single use of both e-cigarettes and THS (one product use per session) causes less detrimental acute changes than cigarette smoking in the clinical markers associated with the development of smoking-related disease (including oxidative stress, platelet activation, flow-mediated dilation, and blood pressure).

In addition, the effects of reduced exposure to toxicants with THS use have been also studied in a recent 3-year follow-up study in a COPD cohort. Despite the small number of patients in their study, Prof. Polosa and colleagues found that COPD patients using HTPs experienced COPD exacerbation less frequently and showed significant improvements in symptoms, exercise capacity, and overall health-related quality of life than patients who smoke cigarettes.

Interestingly, recent results from an epidemiological study that followed a segment of the population in Kazakhstan over time showed amelioration in health-related parameters already after one year of follow-up. Together with an improvement in respiratory symptoms and lung function, physical exercise capacity (assessed with a 6-min walking test) and metabolic syndrome parameters were improved to a greater extent among IQOS users than cigarette smokers.

According to a more recent study by researchers at the National Institute for Public Health and the Environment (RIVM), the Netherlands, THS' users' reduced exposure to toxicants could have a potential beneficial effect on life expectancy. In a case study involving THS, the authors evaluated eight carcinogens that are present both in cigarette smoke and THS aerosol and reported a 10- to 25-fold lower exposure with THS use under the study conditions, indicating less reduction in expected life span.

In summary, the totality of the evidence available to date demonstrates that smokers who switch from cigarette smoking to THS use experience a significant reduction in exposure to HPHCs compared to continuing smoking, because of the lack of combustion in THS. This is also reflected in favorable changes in clinical risk markers known to be involved in the development of smoking-related disease, which shift in the same direction as in smoking cessation. While we should reiterate that THS is not risk-free and provides nicotine, which is addictive, it is important to note that the totality of the scientific evidence available indicates that switching completely to THS presents less risk of harm than continued smoking.

Literature with the authors

Authors:
Giuseppe Plebani MD, Elena Scotti
Giuseppe.Plebani@pmi.com

DiMi MED MEDICA®

9TH DIMIMED

INTERNATIONAL CONFERENCE ON DISASTER AND MILITARY MEDICINE

NOVEMBER 15-16, 2021

TRADE FAIR, DÜSSELDORF

REGISTER NOW:

WWW.DIMIMED-DUESSELDORF.DE

Chairmen

Rob van der Meer, MD
Brigadier General (ret)
Former Surgeon General
of the Netherlands Armed Forces

Gerald M. Kerr
Colonel (ret), Former Surgeon General
& Director Medical Corps Irish Defence Forces

GENERAL DYNAMICS
European Land Systems

EAGLE Family of Vehicles

Best protection and mobility for a broad mission spectrum

gdels.com

The Transatlantic Partner for Land Defense in Europe

Overview of all members of the MMCC

	Belgium, Kingdom of	**Surgeon General** Pierre Neirinckx MD, *Major General MC*
	Czech Republic	**Surgeon General** Zoltan Bubenik MD, *Brigadier General*
	Estonia	**Surgeon General** Targo Lusti, *Lieutenant Colonel*
	French Republic	**Surgeon General** Dr Philippe Rouanet de Berchoux, *Lieutenant General*
	Germany, Federal Republic of	**Surgeon General** Dr Ulrich Baumgärtner, *Lieutenant General*
	Greece (Hellenic Republic)	**Surgeon General** Georgios Toulumis MD, *Major General*
	Hungary, Republic of	**Surgeon General** Dr István Kopcsó, *Brigadier General*
	Italian Republic	**Surgeon General** Nicola Sebastiani, *Lieutenant General*
	Lithuania	**Surgeon General** Raimundas Blaviesciunas, *Lieutenant Colonel*
	Luxembourg, Grand Douchy of	**Surgeon General** Cyrille Dupont MD, *Lieutenant Colonel*
	Netherlands, Kingdom of the	**Surgeon General** Remco Willem Blom, *Commandeur (Rear Admiral)*
	Norway, Kingdom of	**Surgeon General** Jon Gerhard Reichelt, *Major General*
	Poland, Republic of	**Surgeon General (Civ)** Dr Aurelia OSTROWSKA, *Director*
	Romania, Republic of	**Surgeon General** Dragoş-Marian Popescu MD PhD, *Major General*
	Slovak Republic	**Surgeon General** Dr Roman Jantoš, *Brigadier General*
	Spain, Kingdom of	**Surgeon General** Antonio RAMON CONDE ORTIZ, *Major General MC*
	Sweden, Kingdom of	**Surgeon General** Claes Ivgren DVM, *Colonel*
	United Kingdom of Great Britain And Northern Ireland	**Surgeon General (Civ)** Peter Homa, *Director General*

Dräger

**You can't choose your deployment.
But you can choose your equipment.**

Whether you are saving and protecting the lives of others or safeguarding your own, you can count on us. No matter what the situation is. At home in your barracks, abroad on a mission or in the hospital, our products and services are right where you need them – on every single mission. **www.draeger.com**

Dräger. Technology for Life®

3622